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STUDIES IN AMERICAN TETTIGONIIDAE
(ORTHOPTERA)

VI.

BY JAMES A. G. REHN AND MORGAN HEBARD

A SYNOPSIS OF THE SPECIES OF THE GENUS
CONOCEPHALUS FOUND IN AMERICA SOUTH OF
THE SOUTHERN BORDER OF THE UNITED
STATES¹

In a recent paper,² the authors have studied the species of the genus *Conocephalus* found in North America north of Mexico; in that paper the generic references, genotype, description and discussion of the history of the genus and its then recognized subgenera have been fully treated. We were obliged at that time to examine our series of the genus from the other portions of America, and, finding that we had material of the great majority of the species before us and the opportunity to correct many misconceptions, to give many important but hitherto wholly neglected or hurriedly considered characters, as well as to establish a number of very confusing names as synonyms, we determined to study all of the American forms of the genus. The present paper is by no means as complete as the first portion of the study, for in much of the territory considered there has been little or no collecting accomplished and the series before us, though far larger than any others previously studied, contain few specimens of some species and none of several of which the types are inaccessible to us and the original descriptions of the same vague and uncertain. Our efforts are here concentrated in defining the species known to us as accurately as we are able, with the hope that by so doing many of the difficulties and misconceptions of the past may be eradicated from future study of the American forms of the genus.

¹ Published with the aid of the Orthoptera Fund.

² Trans. Am. Ent. Soc., xli, pp. 155 to 224, (1915).

The following key includes, in addition to the subgenera recognized by us in the first paper, others here erected. Unquestionably numerous other subgenera exist and will be described when careful study of the species of the world is made.

Key to the Subgenera of the Genus Conocephalus

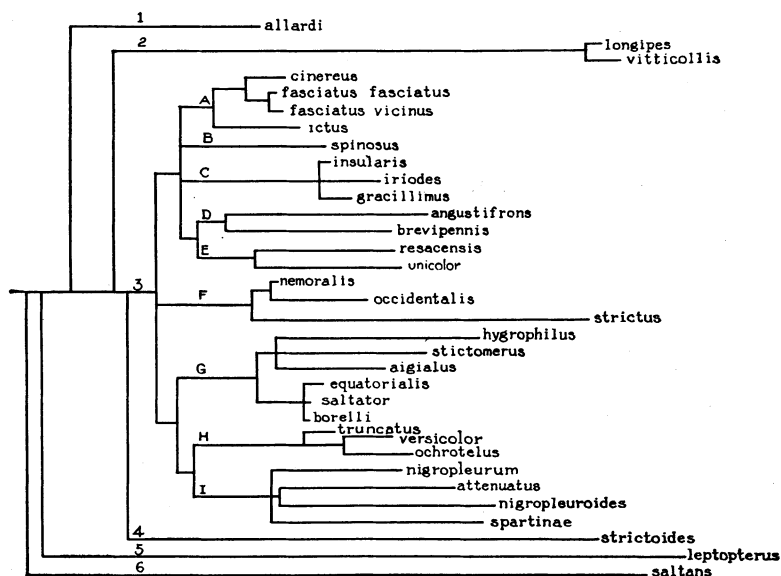
- A. Prosternum bispinose.
- B. Caudal tibiae armed at distal extremity with three pairs of spurs.
- C. Ventral margins of cephalic and median tibiae armed with five to seven (normally six) well spaced spines.
- D. Male subgenital plate produced in long sharp spikes.
- E. Productions situated meso-distad, intervening space strongly obtuse-angulate emarginate; styles absent.
- Dicellura** Rehn and Hebard
- EE. Productions situated disto-laterad, intervening space roundly emarginate; awl-like styles present, situated on ventral surfaces of lateral productions.
- Opeastylus** new subgenus
- DD. Male subgenital plate with distal margin more or less decidedly truncate with no decided emargination or production; small, slender, filiform styles present disto-laterad.
- Xiphidion** Serville
- CC. Ventral margins of cephalic and median tibiae armed with nine to ten closely set spines.
- Palotta** F. Walker
- BB. Caudal tibiae armed at distal extremity with five spurs (interno-dorsal spur missing). Ventral margins of cephalic and median tibiae armed with six well spaced spines. Male subgenital plate as in *Xiphidion*.
- Perissacanthus** new subgenus
- BBB. Caudal tibiae armed at distal extremity with a single pair of spurs (dorsal and ventral pairs absent). Ventral margins of cephalic and median tibiae armed with seven to eight well spaced spines.
- Aphauropus** new subgenus
- AA. Prosternum unarmed. (Ventral margins of cephalic and median tibiae armed with five to seven well spaced spines.)
- B. Caudal tibiae armed at distal extremity with three pairs of spurs.
- Conocephalus** Thunberg
- BB. Caudal tibiae armed at distal extremity with a single pair of spurs (dorsal and ventral pairs absent). (Male subgenital plate as in *Xiphidion*.)
- Anarthropus** Rehn and Hebard

As yet, *Dicellura* is known only from the southern Appalachian region of the eastern United States, *Opeastylus* is widely distributed in temperate and subtropical South America and the only subgenus found in the former region, *Xiphidion* is the dominant subgenus from subtropical South America northward

and is circumorbital in distribution, *Palotta* and *Conocephalus* are known from the Old World only, *Perissacanthus* has been found only in Paraguay, *Aphauropus* is known only from Tepic, Mexico, while *Anarthropus* is known from a species widely distributed in the United States and southern Canada, and from another species from Java.

The genus is probably found everywhere over the region under consideration south as far as the extremity of the mainland of South America. Lack of material from northern Mexico is much to be regretted. The following forms, treated fully in the authors' first paper on the genus, are unquestionably present in that region, *Conocephalus fasciatus fasciatus*, *fasciatus vicinus*, *spinosis*, *resacensis* and *strictus*; for all of these have been taken in the United States on the Mexican border, and the first and third of these forms are here recorded from farther southward. In addition *Conocephalus hygrophilus* and *spartinae* will very possibly be found to occur in the salt marsh vegetation along the Gulf Coast, south of the Rio Grande, in Mexico. In desert regions the genus is, as in the United States, doubtless confined to mountains, rivers, streams, lakes and irrigated tracts where a constant supply of water is to be found. The low watersheds of the Orinoco, Amazon and La Plata systems do not act as controls in the distribution of the species, but the main chain of the Andes appears to afford an absolute barrier. A single species, widely distributed in North America, alone is known from Bermuda. The Greater Antilles have, apparently, but two species, the least abundant, *C. insularis*, peculiar to these islands, the other, *C. cinereus*, in addition widely distributed from central Mexico to the headwaters of the Amazon. The Lesser Antilles, on the other hand, appear to have but one species, *C. saltator*, which is the most widely distributed and, apparently, the most abundant species from Costa Rica southward throughout South America to Paraguay and Eastern Peru.

The following table illustrates the relationship of the American forms of the genus known to us; showing, in addition to the forms here studied, the position of the forms restricted to North America which have been treated in the previous paper.



The numbers given above designate the six subgenera known from America, the letters indicate the American groups of the very large subgenus *Xiphidion*. Of these, A, B, C and D form more or less of a unit, while E contains two species which are nearly intermediate in position between this and the unit formed by the groups, G, H and I, all three of which latter groups are, however, somewhat more widely separated one from the other than are the first four groups. Group F is distinctive. Comparing the male cerci of the American species of the other subgenera with those of the species constituting groups of the subgenus *Xiphidion*, we find that *C. (Dicellura) allardi* agrees best with group A; the two species *C. (Opeastylus) longipes* and *vitticollis* are distinctive; *C. (Perissacanthus) strictoides* agrees best with group I; *C. (Aphauropus) leptopterus*, being known only from the female sex, can not in this respect be definitely associated, though the general structure of the insect suggests that the male cerci may agree best with group F; while *C. (Anarthropus) saltans* is distinctive.

Material Examined.—We have studied the material of the genus from North America north of Mexico, nearly 3800 specimens, and, in addition to a series of nearly 100 specimens pre-

viously correctly recorded, we have examined and recorded in the present paper 804 specimens, of which 571 are in the Hebard Collection and that of the Academy of Natural Sciences of Philadelphia. The combined figures form a total of about 4700 American specimens of *Conocephalus*.

We desire to express our deep obligation to Mr. A. N. Caudell of the United States National Museum, Dr. Samuel Henshaw of the Museum of Comparative Zoology and Dr. F. E. Lutz of the American Museum of Natural History, for the great privilege of examining and studying all of the material of the genus contained in the collections of those institutions. With the exception of McNeill's *exitiosum* and Bruners's two recently described species we have had before us all of the types of the valid forms of the genus located in America.

*Key to Males of the Species of the Genus Conocephalus found in America north to the southern border of the United States.*³

(No species of the genus with prosternum unarmed is known from the region under consideration.)

A. Caudal tibiae armed distad with three pairs of spurs.

B. Subgenital plate very strongly and sharply produced latero-distad in sharp straight spikes which are weakly divergent, on the ventral surfaces of which productions are situated awl-like styles, distal margin of plate roundly emarginate mesad.

(Subgenus **Opeastylus**)

C. Form moderately slender. Fastigium of vertex little over one-half width of proximal antennal joint. Convex callosity of lateral lobes very broad. Swollen shelf above cercal tooth less extensive. Caudal femora with ventro-external margins armed normally with two and three spines.

longipes (Redtenbacher)

CC. Form moderately robust. Fastigium of vertex somewhat more than two-thirds width of proximal antennal joint. Convex callosity of lateral lobes exceedingly broad. Swollen shelf above cercal tooth more extensive. Caudal femora with ventral margins unarmed.

vitticollis (Blanchard)

BB. Subgenital plate not produced disto-laterad, disto-lateral styles small and filiform, distal margin of plate nearly or exactly transverse.

(Subgenus **Xiphidion**)

C. Cerci armed with a heavy mesal (vertical) tooth so that its base is entirely visible from above, this tooth situated mesad.

D. Cerci with mesal portion not contrastingly swollen.

³ See p. 235 for a discussion of the species not represented in our material.

E. Cerci with distal portion not greatly produced, weakly to very decidedly depressed, and with apex broad and rounded.

F. Tympanum of tegmina not unusually elongate. Convex callosity of lateral lobes not very broad. Vertex moderately produced.

G. Cerci with distal portion moderately produced, the depression of the same being general and not more decided on the inner side.

H. Fastigium of vertex about two-thirds⁴ width of basal antennal joint. Ventral margins of caudal femora normally unarmed (spines when present never more than one to three).

I. Eyes moderately large. Convex callosity of lateral lobes very narrow. Abdomen immaculate, with distal half, including cerci, uniform and striking yellow. Distal portion of cerci decidedly depressed and narrowing more sharply to the more narrowly (but still rather broadly) rounded apex. (Form moderately slender.) **cinereus** (Thunberg)

II. Eyes decidedly small. Convex callosity of lateral lobes moderately but not decidedly broad. Dorsum of abdomen trifasciate, with median line broad. Distal portion of cerci weakly depressed, scarcely narrowing to the very broadly rounded apex.

J. Form slender. Abdominal fasciae moderately distinct, colors not brilliant. **fasciatus fasciatus** (DeGeer)

JJ. Form moderately slender. Abdominal fasciae very distinct, colors brilliant (particularly so in life).

fasciatus vicinus (Morse)

HH. Fastigium of vertex as wide as proximal antennal joint.⁵ Ventro-external margins of caudal femora normally armed.

I. Form moderately robust. Convex callosity of lateral lobes very narrow. Abdomen immaculate, with distal portion, including cerci, clear pale yellow. Cerci heavy, elongate, with distal portion decidedly depressed, scarcely narrowing to the very broadly rounded apex. Ventro-external margins of caudal femora bearing normally three and four spines. **spinus** (Morse)

⁴ Though the above is the normal condition in *C. cinereus*, this usually very constant character varies occasionally in that species from slightly less than two-thirds of to fully the width of the proximal antennal joint, as discussed in the specific treatment.

⁵ This usually very constant character shows a decided variability in *C. ictus*; one series from the state of Vera Cruz, Mexico, including specimens in which the fastigium of the vertex is but two-thirds as wide as the proximal antennal joint. In consequence this variation is important in determining material from that region and must not be overlooked.

II. Form very robust and truncate. Convex callosity of lateral lobes moderately broad. Distal portion of abdomen, including cerci, tawny. Cerci similar to those of *cinereus*. Ventro-external margins of caudal femora bearing normally two and three spines.⁶ **ictus** (Scudder)

GG. Cerci with distal portion more strongly produced and distinctly curved outward, the depression of the same being more decided on the inner side. (Form very robust. Fastigium of vertex strongly ascending, greatest width slightly less than one-half that of proximal antennal joint. Eyes large and protruding. Convex callosity of lateral lobes exceedingly narrow. Abdomen, including cerci, mahogany red. Ventro-external margins of caudal femora bearing normally three and four spines.⁷

angustifrons (Redtenbacher)

FF. Tympanum of tegmina unusually elongate. Convex callosity of lateral lobes very broad. Vertex distinctly produced.⁸

G. Coloration not unusually brilliant; dorsum of abdomen narrowly, but usually strikingly, trifasciate. Cerci normally green, of similar type to those of *fasciatus* but distinctly more elongate and attenuate, with distal portion very strongly depressed (as in *C. gracillimus*). Ventro-external margins of caudal femora sometimes unarmed, sometimes supplied with one to three spines.

insularis (Morse)

GG. Coloration unusually brilliant; wings iridescent; dorsum of abdomen broadly, but not strikingly, trifasciate. Cerci burnt lake, slightly longer than in *fasciatus*, distal portion weakly but distinctly curved outward, with broadly rounded apex briefly but strongly depressed. Ventral margins of caudal femora unarmed.

iriodes new species

EE. Cerci with distal portion very greatly produced, very elongate and attenuate, very weakly depressed distad, with apex strongly acuminate. (Fastigium of vertex about one and one-half times width of proximal antennal joint. Convex callosity of lateral lobes very broad. Dorsum of abdomen normally infuscated, cerci dark. Ventral margins of caudal femora unarmed.) **strictus** (Scudder)

⁶ A number of specimens from the state of Vera Cruz, Mexico, have the ventral margins of the caudal femora unarmed, but are otherwise typical of smaller individuals of the species, as are the specimens showing the variation remarked in the preceding foot-note.

⁷ In this species the armament of the ventral margins of the cephalic and median tibiae is decidedly unusual, in every specimen before us at least one of these margins bears seven, instead of six, spines.

⁸ As in *C. gracillimus*, which has the vertex even more distinctly produced, the occiput ascends evenly toward the vertex, the vertex ascending slightly more decidedly but very nearly in the same plane.

DD. Cerci with mesal portion contrastingly swollen.

E. Form moderately slender. Vertex not strongly but distinctly ascending, fastigium of vertex two-thirds width of proximal antennal joint. Eyes moderately large. Convex callosity of lateral lobes moderately broad. Abdomen immaculate, with distal portion, including cerci, pale yellow brown. Ventro-external margins of caudal femora armed with four to six spines. **unicolor** Bruner

EE. Form very slender, distinctly attenuate. Vertex not ascending, fastigium of vertex slightly wider than proximal antennal joint. Eyes normal. Convex callosity of lateral lobes very broad. Abdomen immaculate with distal portion, including cerci, pale yellowish. Ventral margins of caudal femora unarmed.

resacensis Rehn and Hebard

CC. Cerci armed with a more delicate ventral (vertical) tooth so that its base and often the greater portion is concealed from above, mesal portion of cercus very contrastingly swollen, tooth situated at proximal base of this swelling, (distal portion of cercus greatly depressed).

D. Coloration not unusually brilliant or distinctive.

E. Fastigium of vertex slightly less to slightly more than one-half width of proximal antennal joint. Convex callosity of lateral lobes moderately broad. Ventro-internal margins of caudal femora armed. Discoidal and anal fields of tegmina, and adjacent portion of wings when at rest, distinctly darkened. (Swollen mesal portion of cercus with section above tooth produced overhanging and rather sharply rounded, distal portion elongate, very strongly depressed, particularly on inner side. Form moderately slender. Eyes moderately large. Ventro-external margins of caudal femora armed normally with four and four spines. Wings iridescent.) **equatorialis** (Giglio-Tos)

EE. Fastigium of vertex broader. Convex callosity of lateral lobes very narrow. Ventro-internal margins of caudal femora unarmed. Discoidal and anal fields of tegmina, and adjacent portion of wings, when at rest, not darkened.

F. Cerci of same type as in *equatorialis* but decidedly elongate, varying in production and outward curvature of distal portion to very elongate. Form moderately slender to moderately robust. Eyes moderately large. Fastigium of vertex slightly less than, to fully two-thirds as broad as proximal antennal joint. Ventro-external margins of caudal femora armed normally with two and three spines.⁹ (Wings somewhat iridescent.) **saltator** (Saussure)

⁹ In five specimens from the large series from Trinidad and Venezuela, these margins are unarmed; in four specimens from considerable series from Dominica and Trinidad, the cephalic and median tibiae have the ventro-cephalic margins armed with seven, instead of the normal six, spines. The present species is the most abundant and the most variable over the greater portion of South America, and material must be studied from every aspect if accurate results are to be obtained.

FF. Cerci?¹⁰ Form decidedly robust. Eyes distinctly larger. Fastigium of vertex slightly less than two-thirds as broad as proximal antennal joint.¹¹ Ventro-external margins of caudal femora armed with four to five spines. **borelli** (Giglio-Tos)

DD. Coloration unusually brilliant and distinctive. (Form moderately robust. Convex callosity of lateral lobes very narrow. Cercal tooth directed strongly meso-proximad.)

E. Caudal femora with ventral margins unarmed. Abdomen not unusually colored. (Fastigium of vertex one-half width of proximal antennal joint. Apex of tegmina broadly rounded, truncate. Distal portion of cercus shorter than in *versicolor*, lateral margins converging to the acute apex.) **truncatus** (Redtenbacher)

EE. Caudal femora with ventro-external margins armed. Abdomen conspicuously and remarkably colored.

F. Fastigium of vertex one-half width of proximal antennal joint. Apex of tegmina (in brachypterous condition as well) sharply rounded. Distal portion of cercus elongate with lateral margins weakly irregular but converging very gently and evenly to the rather sharply rounded apex. Caudal femora with ventro-external margins armed with three to five spines.

versicolor (Redtenbacher)

FF. Fastigium of vertex narrow but about two-thirds width of proximal antennal joint. Apex of tegmina broadly rounded, truncate. Mesal swollen portion of cercus more ample and decidedly more elongate than in *versicolor*, distal portion broad and elongate, with lateral margins arcuato-convergent distad to the very sharply rounded apex, thus forming a very narrow gothic arch. Ventro-external margins of caudal femora armed with five to eight spines. **ochrotelus** new species

AA. Caudal tibiae armed at distal extremity with five spurs, the interno-dorsal spur being absent. (Cephalic and median tibiae armed with six well spaced spines. Male subgenital plate as in *Xiphidion*.)

(Subgenus **Perissacanthus**)

(Form very slender. Vertex strongly produced, not ascending, fastigium of vertex slightly more than one-half width of proximal antennal joint. Eyes rather small for South American species. Convex callosity of lateral lobes rather narrow. Apex of tegmina broadly rounded, truncate. Cerci suggesting type found in group I of *Xiphidion*, but distinctive in the characters given in the specific discussion. Ventral margins of caudal femora unarmed.)

strictoides (Caudell)

¹⁰ Though we have no males of this species before us, we are convinced, from the original description and the evident close relationship shown by the females, that males of the species have cerci agreeing at least in general form with those of *C. saltator*.

¹¹ Distinctly narrower than in material of *C. saltator* where the ranges of the two coincide.

AAA. Caudal tibiae armed at distal extremity with one pair of spurs, the dorsal and ventral pairs of spurs being absent. (Agreeing with *Anarthropus* in this respect, but differing in the armed prosternum and armament of the cephalic and median tibiae, the ventral margins of which are armed with seven to eight well spaced spines.) (Subgenus **Aphauropus**)

(Form robust. Vertex not decidedly produced, not ascending, fastigium of vertex two-thirds width of proximal antennal joint. Convex callosity of lateral lobes exceedingly broad. Tegmina greatly aborted and wholly concealed by pronotum, wings absent. Ventral margins of caudal femora unarmed.) **leptopterus** new species

In the above key it must be noted that only the usually most useful and also the most distinctive characters are given; in numerous cases material can only be determined properly through careful consideration of all the specific details which are given, as far as we are able, in the specific treatment. The figures are of great importance in showing frequently complicated differences very difficult to describe clearly, and also degrees of difference, while for females only characters common to both sexes will be found in the above key, the characters peculiar to that sex being discussed in the specific treatment, shown by figures, and tabulated in part on pages 237 to 239.

Many species have individual characters of decided value, which in a key would be cumbersome and confusing. Some of these are: the depth of the fastigium of the vertex and the form of its lateral margins, the shape of the lateral lobes of the pronotum and the humeral sinus, the minor specific differences of the male tegminal tympanum, the spination of the genicular lobes of the caudal femora and the coloration of the genicular areas of the same, the general though obscure pattern of coloration in species not strikingly marked and the length of the styles of the subgenital plate.

Extremely slight variations are found which cannot be wholly overlooked, but which can hardly be considered in the treatment of each species without giving them undue emphasis. Such is the fact, only determinable after examination of large series, that in species having both macropterous and brachypterous forms, the latter type is almost always accompanied by a slight pronotal change, the dorsum of the pronotum being usually slightly less produced caudad, with a proportionate reduction in the depth of the humeral sinus and the caudal margin of the lateral lobes becoming slightly less sinuous than in the macropterous condition.

We have observed that the antennal length is decidedly greater in some species than in others, but accurate measurements of the same are very difficult and these delicate organs are found to be incomplete in so many cases that we have deemed it best to omit discussions of the same.

Efforts to include all the known species in the keys of Redtenbacher,¹² Saussure and Pictet,¹³ Karny¹⁴ and Bruner¹⁵ without having material of many of the species for examination, combined with the employment of such usually worthless characters as tegminal and ovipositor length—given with scarcely any regard to the extremes of variation and in complete disregard of the probability of macropterism and brachypterism appearing in the same species—has made these keys virtually worthless and in many cases misleading in the extreme.

The following described species do not appear to be included in the material before us. In future studies with the present paper they must be carefully considered, but at present we feel only justified in giving the following brief remarks resulting from study of the various original descriptions and in tabulating these species from the same source as far as possible on pages 238 and 239.

caizanum

1897. [*Xiphidium*] *caizanum* Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, xii, no. 302, p. 42. [1 ♂: Caiza, Ecuador.]

The form of the cerci and subgenital plate is apparently different from any other known American species. The species very possibly belongs to an undescribed subgenus, apparently between the subgenera *Dicellura* and *Xiphidion*.

exitiosum

1901. *Xiphidium exitiosum* McNeill, Proc. Wash. Acad. Sci., iii, p. 501, fig. 42. [2 ♂, 3 ♀, 3 juv.: Indefatigable Island, Galapagos Islands.]

This species is so poorly described and the rough sketchy outline figure of the female so unsatisfactory, that we can but state that the species may be related to *C. cinereus*.

¹² Verh. k.-k. zool.-bot. Gesell. Wien, xli, pp. 495-499, (1891).

¹³ Biol. Cent.-Amer., Orth. i, pp. 396-397, (1898).

¹⁴ Abh. k.-k. zool.-bot. Gesell. Wien, xli, pp. 85-94, (1907).

¹⁵ Ann. Carneg. Mus., ix, pp. 372-374, (June 1815).

resinum

1898. *Xiphidium resinum* Saussure and Pictet, Biol. Cent.-Amer., Orth., i, p. 398, pl. xix, figs. 26, 27. [1 ♂: Orizaba, Mexico.]

The brief and very unsatisfactory description, accompanied by good figures of the vertex, affords insufficient evidence for the proper placing of the species. It may be very near *C. angustifrons*, or instead allied to *C. gracillimus*. The characters given agree with *angustifrons* excepting that the vertex is more produced, the specimen is strongly macropterous and the caudal femora have, we are led to suppose, the ventral margins unarmed. The vertex is decidedly too narrow for *gracillimus*. The species with which it is compared, *unispina*, is a member of the genus *Orchelimum*.

doryphorum

1907. *Xiphidium doryphorum* Karny, Abh. k.-k. zool.-bot. Gesell. Wien, iv, p. 96. [1 ♀: Uruguay.]

This diminutive species may be very closely allied to *C. stricoides*. The strongly oblique caudal margin of the lateral lobes of the pronotum and different measurements indicate that it is distinct. Length: body 9, pronotum 3.3, tegmen 0.3, caudal femur 9.7, ovipositor 11 mm.

aberrans

1901. *Xiphidium aberrans* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 516. [More than one ♀: Rio Grande do Sul, Brazil.]

The nine to ten spines of the ventral margins of the cephalic tibiae would apparently place this species in a different subgenus from any of those known from America. The fastigium of the vertex is narrow; the caudal margin of the lateral lobes is distinctly sinuate, the convex callosity oval and distinct.

Of the species previously referred to this genus or its synonyms from North America, *Xiphidium unispina* is known to be a member of the genus *Orchelimum*.¹⁶ We must also bear in mind that the genus *Conocephalus* of authors has applied until recently, not to the present forms, but to those American species which must now be placed in the genera *Neoconocephalus* and *Homocoryphus*.

¹⁶ Vide Rehn and Hebard, Trans. Amer. Entom. Soc., xli, p. 81, (1915).

We give below in tabular form the extremes found in species in tegminal and ovipositor length (in millimeters), and have also stated the general form of the ovipositor and the results obtained from counting the spines of the ventro-external margins of the caudal femora. The normal counts for these spines give the number for each limb individually, the extremes are based on single limbs.

		Tegmina		Ovipositor	Spines of ventro-external margins of caudal femora
		Macropterous	Brachypterous		
<i>longipes</i>	♂	15.3-20.9	.....	straight.	normally 2 and 3.
	♀	16.9-23.3	.....	7.4-9.8 ¹⁷	extremes 1 to 5.
<i>vitticollis</i>	♂	12.8-19.8	.....	straight.	none.
	♀	14.6-20.7	.....	7.6-10.2	
<i>cinereus</i>	♂	20.9 ranging to 8 ¹⁸		straight.	normally 0.
	♀	19.8 ranging to 9		7-11.2	14% 1 to 2
<i>f. fasciatus</i>	♂	11.7-19.3	.....	straight.	normally 0.
	♀	10-21.1	.....	7-9.9	13% 1 to 3.
<i>f. vicinus</i>	♂	16.4-18.7	9.9-13.1 ¹⁹	straight.	normally 0.
	♀	15.6-18.5	10.6-13.9	7.5-13	4% 1 to 2.
<i>ictus</i>	♂	15.2-19.9	6-9.3 ²⁰	straight.	normally 2 and 3.
	♀	19.1	4.8-10.1	9.3-13.9	14% 0.
<i>spinus</i>	♂	14.3-21.1	.....	very weakly	normally 3 and 4.
	♀	16.2-22.8	.....	curved, broader. 7-10.1	extremes 2 to 6.
<i>insularis</i>	♂	18.6 ranging to 21 9.1		straight.	normally 0 and 1.
	♀	19.3 ranging to 11.3		8.9-10.1	41% 0.
					extremes 0 to 3.

¹⁷ Our measurements are taken from the base of the basal plica to the apex of the ovipositor. Redtenbacher gives 10.2 mm. for the maximum ovipositor length of this species, measuring probably from the juncture of the subgenital plate and ovipositor; this measurement is not constant, due to the mobility of the subgenital plate, and would frequently exceed the dimension given by us by about .4 mm.

¹⁸ In this species the intergradation between the extremes of the macropterous and semi-macropterous condition is gradual, and numerous intermediate specimens are before us.

¹⁹ No truly brachypterous form occurs in this geographic race, the material treated in this column being more accurately termed semi-macropterous.

²⁰ Tegminal length of one intermediate male 11.4 mm., and of one intermediate female 13.9 mm. This is the only American species known to us in which intermediates are found, though rarely, between a strongly macropterous and a strongly brachypterous condition.

²¹ As in *cinereus*, the intergradation between the extremes of the macropterous and semi-macropterous condition is gradual.

		Tegmina		Ovipositor	Spines of ventro-external margins of caudal femora
		Macropterous	Brachypterous		
<i>iriodes</i>	♂	15.2-16.4	.....	nearly straight.	none.
	♀	16.2-19.3	.....	7.3-7.9	
<i>angustifrons</i>	♂	.....	8.2-9.4	nearly straight.	normally 3 and 4.
	♀	15.9	6.5-8.7	8-10	extremes 1 to 7.
<i>resacensis</i>*	♂	.....	7.1-8.8	straight.	none.
	♀	.....	5.6-6	15.2-15.6	
<i>unicolor</i> *	♂	17	.....	nearly straight.	normally 4 and 5.
	♀	18.4-18.9	.....	14.7-16.4	extremes 4 to 6.
<i>strictus</i>	♂	15.7-17.8	5.1-7.3	nearly straight.	none.
	♀	15.4-22	2.8-5.8	17.7-32.3	
<i>equatorialis</i>	♂	17.3-19.6	12.2-14.6	nearly straight.	normally 4 and 4.
	♀	18.1-19.5	11 ²² -15 ²²	7.2-9.9 ²³	extremes 1 to 6.
<i>saltator</i>	♂	15-20.4	5.8-8.8	weakly curved	normally 2 and 3.
	♀	16.7-21.3	3.3-6.1	to nearly straight.	-2% 0.
<i>borelli</i>*	♂	.....	4 ²²	8.4-14.9	normally 4 and 5.
	♀	.....	2.5 ²² -3.9	distinctly curved.	extremes 4 to 5.
<i>truncatus</i>	♂	.....	5.2-5.8	7.8 ²² -10.1	
	♀	.....	2.6-2.9	weakly but distinctly curved.	none.
<i>versicolor</i> *	♂	19 ²²	5.5 ²⁵ -7.6	8-8.9	
	♀	20.3-22 ²⁴	6 ²⁵ -7 ²⁵	nearly straight.	normally 4 and 4.
<i>ochrotelus</i>**	♂	.....	4.9 and 5.2 ²⁶	9 ²⁵ -13	extremes 3 to 5.
	♀	.....	.....	?	extremes 5 to 8.
<i>strictoides</i>*	♂	.....	7.6-7.9	nearly straight.	none.
	♀	.....	3 ²² -3.5 ²²	21.1-24 ²²	
<i>leptopterus</i>**	♂	.....	.....	nearly straight.	none.
	♀	.....	concealed.	30.1	
INCERTAE SEDIS ²⁷ :					
<i>caizanum</i>**	♂	.....	"4"	?	"none."
	♀		
<i>exitiosum</i>	♂	.....	"6"	"very slightly curved."	"none."
	♀	.....	"8"	"12"	

²² This measurement is taken from the original description.

²³ Though the extremes of the series before us are as given here, we find that a length of over 8. mm. is very exceptional in the present species.

²⁴ Giglio-Tos gives this measurement in his description of the female of this species.

²⁵ Giglio-Tos gives this measurement in his original description of the synonymous *festae*.

²⁶ In this unique type the tegmina are not of equal length.

²⁷ The following data is quoted from the various original descriptions.

		Tegmina		Ovipositor	Spines of ventro- external margins of caudal femora
		Macropterous	Brachypterous		
<i>resinum</i> **	♂	"19"	.....	?	none (by inference).
	♀		
<i>aberrans</i>*	♂	.....	.....	"subrectus."	"none."
	♀	"17-20.5"	.....	"8.5-9"	
<i>doryphorum</i>**	♂	.....	.....	"rectus."	"none."
	♀	...	"0.3"	"11"	

In the species marked with an asterisk not sufficient material is known to give the probable extremes of the above dimensions, those marked with two asterisks are known from the unique types.

In the known females of the species here considered, the ovipositors of all range from scarcely arcuate to straight excepting in *C. borelli* and *C. truncatus*, and in *C. spinosus* the arcuation is nearly as pronounced as in those species, accompanied by a distinctive shape.

Comparison with an analogous chart²⁸ in the authors' first paper on the present genus shows, that in tropical America fewer species are known to develop both macropterous and brachypterous conditions than in the United States. This is doubtless partially due to the fact that our knowledge of the tropical species is in almost every case more limited. In future time, experimentation and study will doubtless bring to light many interesting factors governing the development and relative abundance of the macropterous and brachypterous condition in the species of this genus.

Subgenus **Opeastylus**²⁹ new subgenus

The subgenus includes two species, both from temperate and subtropical South America.

Type of Subgenus—*Conocephalus vitticollis* [*Locusta vitticollis*] (Blanchard).

Subgeneric Description.—Prosternum bispinose. Subgenital plate of male very strongly and sharply produced disto-laterad in sharp straight spikes which are weakly divergent, on the ventral surfaces of these productions are situated awl-like styles,

²⁸ Trans. Am. Ent. Soc., xli, p. 167, (1915).

²⁹ From *δπεας*=awl and *στυλος*=a pillar (the styles), in allusion to the awl-like styles of the male subgenital plate in the species of the subgenus.

above which the produced portions are bent suddenly upward thence again horizontal, their apices reaching as far as the extremity of the enlarged proximal portion of the styles; between these productions the distal margin of the plate is roundly emarginate at an angle of a little less than ninety degrees. Ventral margins of cephalic and median femora armed with six well spaced spines. Caudal tibiae armed at distal extremities with three pairs of spurs. Size medium for the genus.

Conocephalus longipes (Redtenbacher) (Pl. XXII, fig. 1; XX,; 1, 2, 32 and 33; XXIV, 1.)

1891. *Xiphidium longipes* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 505, pl. iv, figs. 81 a and b. [Buenos Aires [Argentina]; Montevideo [Uruguay]; Rio Grande do Sul and Santa Catharina [Brazil].]

The present insect is closely related to *C. vitticollis*, but may be readily separated by the narrow fastigium of the vertex, more slender form, less extensive enlarged portion of male cerci overhanging the cercal tooth, somewhat narrower ovipositor in the female and armed ventro-external margins of the caudal femora.

Redtenbacher has given a portion of the major differences, but has misrepresented others in his brief and unsatisfactory original description.

Vertex rather decidedly produced for the genus.³⁰ Fastigium of vertex but little over one-half as wide as proximal antennal joint, narrowing with a distinct but weak concavity to the facial suture, when seen from front distinctly twice as deep as greatest width. Eyes small. Lateral lobes of pronotum of moderate width, cephalic margin weakly arcuate, with scarcely a trace of the ventro-cephalic angle, to the broadly rounded ventro-caudal angle which is a little less than ninety degrees, caudal margin weakly arcuate to the broad and distinct humeral sinus, convex callosity very broad. Tegmina long and slender,³¹ particularly toward the sharply rounded apex; tympanal field of males rather

³⁰ This species and *C. gracillimus* have the vertex more distinctly produced than in any other American forms known to us, and agree in having the occiput ascending evenly toward the vertex and the vertex ascending slightly more decidedly but very nearly in the same plane. In other respects the two species are greatly dissimilar.

³¹ The extremes of tegminal length for this and the other species here treated are given in tabular form on pages 237 to 239.

large for the genus, nearly quadrate. Male cercus moderately stout and rather short; with a long slender weakly incurved ventral tooth, which is directed weakly proximo-ventrad, situated just distad of the median point; above this tooth the shaft of the cercus is produced in an overhanging shelf, which extends nearly two-thirds the distance to the base of the cercus and is narrow but evenly rounded in outline; beyond the tooth the shaft of the cercus narrows regularly and rapidly to the sharply rounded apex and is somewhat flattened vertically on inner side, not depressed. No approach toward brachypterism is apparent, the decided amount of variation in tegminal length in the twenty-three specimens before us being due to a general greater or lesser size development, which in this series we believe to be the result of local environmental conditions. The caudal femora vary similarly in length, ♂ 11-12.8, ♀ 11.8-14.8 mm.; the genicular lobes are normally bispinose; the genicular areas are not darkened; the ventro-external margins are armed in the eighteen perfect individuals before us as follows:

Number of spines,	1-1	1-2	1-3	1-4	2-2	2-3	2-4
Number of specimens,	2	1	3	1	2	1	1
Number of spines,	3-3	3-4	3-5	4-5	5-5		
Number of specimens,	2	4	2	1	1		

The dorsum of the abdomen bears on each side an indistinct pale yellowish line.

The localities represented in the typical series and the material before us cover the entire known range of the species. The localities represented by our series of twenty-four recorded specimens are: Rio Grande do Sul, Brazil³²; Sapucay, Paraguay; Misiones, Buenos Aires, Chacras de Coria and San Ignacio, Province of Mendoza, Argentina. We have but three unrecorded specimens of the insect.

Puerto Cantera, Alto Paraná, Paraguay, XII, 9, 1913, (C. Schrottky), 1 ♀, [A. N. S. P.].

Carcaraña, Santa Fé, Argentina, 1 ♂, 1 ♀, [A. N. S. P.].

³² Two females before us from this locality are paratypes, sent to the Academy of Natural Sciences by Saussure.

Conocephalus vitticollis (Blanchard) (Pl. XXII, fig. 2; XXIII, 3 and 4; XXIV, 2.)

1851. *Locusta vitticollis* Blanchard, in Gay, Hist. fisica polit. Chile, Zool., vi, p. 46, Orth. pl. II, figs. 5, a and b. [Coquimbo Province, Chile.]

This species, which replaces *C. longipes* in Chile, is a closely related form, but readily separable by the characters given under that species.

Vertex not as much produced as in *longipes* and accordingly slightly less ascending. Fastigium of vertex over two-thirds width of proximal antennal joint, narrowing with a distinct concavity to facial suture, when seen from front about one and two-thirds times as deep as greatest width. Eyes moderately large. Lateral lobes of pronotum similar to those of *longipes* excepting that they are distinctly broader and the ventro-cephalic angle is noticeable as a very broadly rounded obtuse-angulation, convex callosity exceedingly broad. Tegmina proportionately shorter than in *longipes*, becoming extremely slender distad toward the sharply rounded apex; tympanal field of males as in *longipes*. Male cerci much as in *longipes* but proportionately shorter and more compact, with portion overhanging tooth thicker and extending a full two-thirds of the distance to the base of the cercus. No approach toward brachypterism is apparent though the measurements³³ show decided variability due to a general greater or lesser size development³⁴; the proportionate tegminal length when compared with that of *longipes* is distinctly less than in that species. The caudal femora vary similarly in length, ♂ 10.7–14.3, ♀ 12.9–15.6 mm.; the genicular lobes are normally bispinose; the genicular areas are not darkened³⁵; the ventral margins are unarmed. The dorsum of the abdomen is frequently infuscated in the present species and in such material the narrow lateral yellowish lines, found weakly indicated in *longipes*, are very striking.

³³ Vide page 237.

³⁴ The large series from El Olivar, Chile, averages very decidedly larger than any of the other specimens before us. A warmer and more humid environment accompanied by more luxuriant vegetation apparently produces a decided size increase in many species of Orthoptera.

³⁵ In some, more richly colored specimens of this and other species, the tissue in drying is found to settle to a certain extent in these areas, and careful examination is sometimes necessary to detect the fact that such darkening is due to discoloration.

The species is known only from Chile, from the province of Coquimbo southward to Valdivia. The Andes undoubtedly separate its distribution from that of *longipes*.

Specimens Examined: 66; 22 males, 12 females, 10 immature males and 22 immature females.

El Olivar, Colchagua, Chile, I, 1905, (C. S. Reed), 19 ♂, 7 ♀, 10 juv. ♂, 22 juv. ♀, [A. N. S. P.].

Penco, Concepcion, Chile, II, 1904, (C. S. Reed), 1 ♀, [A. N. S. P.].

Concepcion, Concepcion, Chile, II, 10, 1904, (C. S. Reed), 1 ♂, [A. N. S. P.].

Hualqui, Concepcion, Chile, II, 25, 1904, (C. S. Reed), 2 ♀, [A. N. S. P.].

Coronel, Concepcion, Chile, I, 1904, (C. S. Reed), 1 ♂, 1 ♀, [A. N. S. P.].

Lota, Concepcion, Chile, I, 1904, (C. S. Reed), 1 ♀, [A. N. S. P.].

Subgenus **Xiphidion** Serville

1831. *Xiphidion* Serville, Ann. Sci. Nat., xxii, p. 159.

1912. *Xiphidion* Karny, Gen. Ins., fasc. 135, Subfam. Conocephalinae, p. 8.

Conocephalus cinereus Thunberg (Pl. XXII, fig. 12; XXIII, 5 and 6.)

1815. *C[onocephalus] cinereus* Thunberg, Mém. Acad. Imp. Sci. St. Pétersbourg, v, p. 273. [Jamaica.]

1874. *Orchelimum ortonii* Scudder, Proc. Bost. Soc. Nat. Hist., xvii, p. 265. [Peruvian Maraón.]

Thunberg's description is very brief and unsatisfactory, but recent collections made in Jamaica have enabled us to place this species beyond question.

Constant misconception of *C. fasciatus* has, however, resulted in the present insect being recorded as that species many times, by Burmeister, Gundlach, Redtenbacher, Griffini, Saussure and Pictet, Karny, Morse and Rehn, while semi-brachypterous individuals from Cuba have been recorded as *brevipennis* by Bolivar and Gundlach, and from Cuba, Jamaica and the Bahamas by Rehn. To these mistakes have been added misidentifications as *saltator* by Redtenbacher, Brunner and Saussure and Pictet and as *fasciatum* variety *saltator* by Griffini. All of these difficulties were due to the then universally supposed importance of tegmenal length and complete disregard of the not as readily observed male genitalic characters, the form of the lateral lobes of the pronotum and the color pattern in both sexes.

Examination of the type of Scudder's *Orchelimum ortonii* proves that it is an absolute synonym of the present species, based upon a unique dried-alcoholic female in the macropterous condition.

The present insect is related to *C. fasciatus*, differing from that

species mainly in the somewhat more robust form; larger and more prominent eyes; broader and differently shaped lateral lobes of the pronotum; immaculate abdomen, the distal half of which in males of *cinereus* is uniform and striking yellow in life (in various specimens varying in shade from cadmium to capucine yellow), and in the male cerci being more elongate with the distal portion decidedly depressed and lateral margins of same distinctly converging (this more noticeable as the distal portion is decidedly more elongate than in *fasciatus*), and with the apex more narrowly but still broadly rounded. The male cerci are concolorous with the distal portion of the abdomen in this species; in *fasciatus* they are green unless discolored in drying.

Vertex not strongly but distinctly ascending. Fastigium of vertex normally about two-thirds, varying occasionally from less than two-thirds to fully the width of the proximal antennal joint, narrowing with a distinct but very weak concavity to facial suture, when seen from front about one and one-half times as deep as greatest width. Eyes moderately large and prominent. Lateral lobes of pronotum broader than in *fasciatus*, cephalic margin moderately oblique and nearly straight to the broadly rounded obtuse-angulate ventro-cephalic angle, thence nearly straight to the sharply rounded ventro-caudal angle which is distinctly less than ninety degrees, caudal margin weakly sinuous, nearly straight to the shallow humeral sinus, convex callosity very narrow. Tegmina macropterous, varying to a semi-brachypterous condition in all large series from various portions of the range of the species, apex of tegmina always sharply rounded. Male cerci as described above. The genicular lobes of the caudal femora are normally bispinose³⁶; the genicular areas are not darkened; but sixteen of a series of over one hundred perfect specimens before us have the ventro-external margins of the caudal femora armed as follows:

Number of spines,	0-1	0-2	1-1	1-2	2-2	2-3
Number of specimens, ³⁷	6	1	6	1	1	1

³⁶ As in almost all of the species showing this condition, rare individuals are found having one, two or three of these lobes unispinose, and very rarely this is true for all four of the genicular lobes of the caudal femora. In species having these lobes normally unispinose, a bispinose condition of even one or two of the lobes is very rarely found.

³⁷ From the Bahamas, one; Jamaica, five; Costa Rica, one; Panama, one; Venezuela, one; French Guiana, two; Peru, five (of six before us.).

In females the yellow area of the distal portion of the abdomen is reduced in size and decidedly less brilliant than in males.

The specimens from Puntarenas, and Rio Grande, Costa Rica, have the vertex unusually narrow, appreciably less than two-thirds the width of the proximal antennal joint; a number of specimens have the vertex decidedly wider than usual, and the specimens from St. Thomas, West Indies, and Medellin, Mexico, have this width fully equal to that of the proximal antennal joint. In spite of such variation in this and a few other species, the character may be said to be on the whole of considerable diagnostic value, particularly when considered in conjunction with other important characters. No single characters may be relied upon for specific determinations in the present genus without disastrous results.

Measurements (in millimeters) of extremes

	Length of tegmen		Length of caudal femur		Length of ovipositor
	♂	♀	♂	♀	
Havana, Cuba	10.9-17.3	11.1-19.7	10.1-12.9	10.9-14.3	8-10.7
Montego Bay,					
Jamaica . . .	9.4-17.1	9-17.1	9.2-12.1	9.9-12.3	7-9.2
Costa Rica . . .	13.9-19.2	12.3-18.6	12.2-13.2	12.7-13.2	9.1-9.7
Ancon, Panama	14.9-18.7	15.7-19.8	13-13.4	13.6-14.4	10.1-11.2
La Pedrita, Ven-					
ezuela	13-16.9	15.7-16.9	12-12.2	12.7-13.1	8.8-8.9
Cayenne, French					
Guiana . . .	17.2	19.4	13.2	14.6	10.1
Eastern Peru .	19-20.9	19.1	13.3-15.4	14.7	9.4

At Montego Bay, Jamaica, a series was taken in short grass along the Montego River—these specimens are distinctly depauperate; specimens taken in areas of heavier grass near the jungle at the same locality are of normal size. Observation of the species elsewhere in the field in Jamaica and Panama, convinces us that the considerable variation in size and tegminal length is due chiefly to immediate environment; local luxuriance of vegetation appears to be usually accompanied by local aggrandizement of individuals of the species of this and many other genera of Orthoptera.

The present insect is known from the Bahamas, Cuba, Hayti, Porto Rico and adjacent smaller islands, Jamaica, continental America from Vera Cruz, Mexico, southward through Costa Rica

and Panama to northern South America, where it is known south-eastward as far as Cayenne, French Guiana, and southwestward as far as Contamano, Peru. It is the dominant species of the genus only in the Bahamas, Greater Antilles and northernmost Lesser Antilles.

In the present instance, we have included below material previously misidentified and now before us, to assist in future distributional and other studies.

Specimens Examined: 200; 104 males, 77 females, 6 immature males and 13 immature females.

Nassau, New Providence Island, Bahamas, I, 31, 1904, (Hebard; in short grass), 2 ♂, 2 ♀,³⁸ [Hebard Cln.]; VI, 28, 1904, (G. M. Allen), 1 ♂, 1 ♀,³⁹ [M. C. Z.], (all semi-macr.).⁴⁰

Guane, Pinar del Rio, Cuba, IX, 24 to 26, 1913, (F. E. Lutz), 6 ♂, 5 ♀, 1 juv. ♀, [Am. Mus. Nat. Hist.], (3 ♂, 3 ♀ semi-macr.).

North of Viñales, Pinar del Rio, Cuba, IX, 16 to 22, 1913, (F. E. Lutz), 1 ♂, [Am. Mus. Nat. Hist.].

Pinar del Rio, Pinar del Rio, Cuba, IX, 9 to 24, 1913, (F. E. Lutz), 4 ♂, 5 ♀, [Am. Mus. Nat. Hist.].

Cabañas, Pinar del Rio, Cuba, IX, 5 to 8, 1913, (F. E. Lutz), 4 ♂, [Am. Mus. Nat. Hist.], (3 semi-macr.).

Havana, Cuba,⁴¹ I, 23, 1904, (Hebard), 6 ♂, 1 ♀, 1 juv. ♀, [Hebard Cln.]; (C. F. Baker), 1 ♂, 2 ♀, [A. N. S. P.], (2 ♂, 1 ♀ semi-macr.).

Cayamas, Oriente, Cuba, XII, 21 to II, 28, (E. A. Schwarz), 2 ♂, 2 ♀, [U. S. N. M.], (1 ♀ semi-macr.).

Cristo, Oriente, Cuba, X, 3, 1913, (F. E. Lutz), 2 juv. ♀, [Am. Mus. Nat. Hist.].

Guantanamo, Oriente, Cuba, X, 4 to 8, 1913, (F. E. Lutz), 5 ♂, 3 ♀, 2 juv. ♀, [Am. Mus. Nat. Hist.], (3 ♂, 4 ♀ semi-macr.).

Baracoa, Oriente, Cuba, IX, 15 to X, 4, 1901, (A. Busck), 2 ♂, 3 ♀, [U. S. N. M.], (3 ♀ semi-macr.).

San Francisco Mountains, San Domingo, IX, 1905, (A. Busck), 5 ♂, 3 ♀, [U. S. N. M.].

Mona Island, Porto Rico, II, 21 to 26, 1914, 1 ♂, 3 juv. ♂, 2 juv. ♀, [Am. Mus. Nat. Hist.], (♂ semi-macr.).

³⁸ Recorded by Rehn as *X. brevipenne*, Bull. Am. Mus. Nat. Hist., xxii, p. 116, (1906).

³⁹ Recorded by Morse as *X. fasciatum*, Psyche, xii, p. 20, (1905).

⁴⁰ The less usual conditions of tegminal development are given in parentheses at the end of each record in the present paper except where, in certain species, it has been thought best to give the condition for each specimen. Mac.=macropterous and brach.=brachypterous. Dried alcoholic material is also indicated by "dr. alch."

⁴¹ The semi-macropterous material of this series has been recorded as *X. brevipenne* (in part), the macropterous as *X. fasciatum* (in part) by Rehn, Cent. Exp. Sta. Rept. Cuba, p. 216, (1909).

Mayaguez, Mayaguez, Porto Rico, XII, 18, 1911, II, 23, 1912, (C. W. Hooker), 1 ♂, 1 ♀,⁴¹ [U. S. N. M.], (semi-macr.); I, 1899, (A. Busck), 1 ♀, [U. S. N. M.].

Arecibo, Arecibo, Porto Rico, VII, 30 to VIII, 1, 1914, 2 juv. ♂, [Am. Mus. Nat. Hist.].

San Juan, Porto Rico, VIII, 2 and 3, 1914, 1 juv. ♂, 1 juv. ♀, [Am. Mus. Nat. Hist.].⁴²

Bayamon, San Juan, Porto Rico, I, 1899, (A. Busck), 2 ♂, [U. S. N. M.], (1 semi-macr.).

Rio Piedras, Humacao, Porto Rico, VI, 1902, (O. W. Barrett), 2 ♂, 1 ♀,⁴² [A. N. S. P.]; IX, 24, 1912, (T. H. Jones), 1 ♂, [U. S. N. M.].

Arroyo, Guayama, Porto Rico, II, 1899, (A. Busck), 1 ♂, 2 ♀⁴² [U. S. N. M.], (1 ♀ semi-macr.).

Culebra Island, Porto Rico, II, 1899, (A. Busck), 2 ♀,⁴² [U. S. N. M.], (semi-macr., dr. alch.).

Vieques Island, Porto Rico, III, 27, 1900, (C. W. Richmond), 1 ♀,⁴³ [U. S. N. M.].

St. Thomas, West Indies, VIII, 2, (A. Busck), 1 ♂, 1 ♀, [U. S. N. M.].

Lapland, Catadupa, Jamaica, III, 9, 1911, 1 ♀, [Am. Mus. Nat. Hist.], (semi-macr.).

Montego Bay, Jamaica, III, 6, 1911, [Am. Mus. Nat. Hist.], 1 ♀; XI, 3 and 4, 1913, (Hebard), 6 ♂, 5 ♀, [Hebard Cln.], (5 ♂, 3 ♀ semi-macr.).

Mandeville, Jamaica, XI, 6, 1913, (Hebard; grassy pasture), 1 ♂, [Hebard Cln.].

Rio Cobre near Bogwalk, Jamaica, X, 25, 1913, (Hebard; open grassy areas), 2 ♂, 1 ♀, [Hebard Cln.], (1 ♂, semi-macr.).

Grange Lane, Jamaica, X, 25, 1913, (Hebard; heavy grass near forest), 1 ♂, 1 ♀, [Hebard Cln.].

Kingston, Jamaica, X, 23, 1913, (Hebard; grassy pasture), 8 ♂, 7 ♀, [Hebard Cln.], (7 ♂, 5 ♀ semi-macr.).

Stony Hill, Jamaica, X, 25, 1913, (Hebard), 2 ♂, [Hebard Cln.], (semi-macr.).

Hope Gardens, Jamaica, II, 22, 1911, 1 ♂, [Am. Mus. Nat. Hist.], (semi-macr.).

Medellin, Vera Cruz, Mexico, IX, 1895, (L. Bruner), 1 ♀, [Hebard Cln.], (semi-macr.).

Old Vera Cruz, Vera Cruz, Mexico, XII, 8, 1909, (F. C. Bishopp), 1 ♂, [U. S. N. M.], (semi-macr.).

San Rafael, Vera Cruz, Mexico, (C. H. T. Townsend), 1 ♂, 1 ♀, [Hebard Cln.], (semi-macr.).

⁴² Recorded by Rehn as *X. fasciatum*, Trans. Am. Ent. Soc., xxix, p. 134, 1903.

⁴³ Recorded by Rehn as *X. fasciatum*, Bull. Am. Mus. Nat. Hist., xxviii, p. 76, (1910).

Isla del Coco, Costa Rica, III, 1902, (P. Biolley), 2 ♂, 2 ♀, [A. N. S. P.], (semi-macr.).

Gulf of Nicoya, Costa Rica, 1 ♀, [Hebard Cln.].

Puntarenas, Costa Rica, II, 1907, (P. Biolley; strand, leaves of *Ipomaea*),⁴⁴ 1 ♀, [A. N. S. P.], (semi-macr.).

San José, Costa Rica, III and VI, 1904 to 1906, 1160 meters elevation, (P. Biolley), 3 ♀,⁴⁵ [A. N. S. P.], (1 semi-macr.).

Rio Grande, Costa Rica, III, 6, 1902, (M. Cary), 1 ♂, [Hebard Cln.], (semi-macr.).

Carillo, Costa Rica, III, 1902, (P. Biolley), 1 ♀, [Hebard Cln.].

Guatel, Costa Rica, (C. F. Underwood), 1 ♂,⁴⁵ [A. N. S. P.].

Paraíso, Costa Rica, IV, 20, 1910, (P. P. Calvert), 1 ♀, [A. N. S. P.], (semi-macr.).

Juan Viñas, Costa Rica, VII, 31, 1909, (P. P. Calvert), 1 ♀, [A. N. S. P.].

Siquires, Costa Rica, VIII, 3, 1903, (M. A. Carriker, Jr.), 2 ♂, [Hebard Cln.].

Ancon, Canal Zone, Panama, XI, 12, 1913, (Hebard; open marshy grassland), 6 ♂, 6 ♀, (1 ♂, 2 ♀ nearly semi-macr.).

La Piedrita, Venezuela, II, 16, 1911, (S. Brown), 14 ♂, 2 ♀, 4 juv. ♀, [A. N. S. P.], (8 ♂ semi-macr.).

Cali, Cauca Valley, Colombia, V, 26, 1914, (H. S. Parish), 3 ♂, [A. N. S. P.], (2 semi-macr.).

Cayenne, French Guiana, 1 ♂, (W. Schaus), [U. S. N. M.]; 1 ♀, (Ex Sausure, labelled *fasciatus*), [A. N. S. P.], (dr. alch.).

Rio Marañon, Peru, 1 ♀, [M. C. Z.], type of *Orchelimum ortonii* Scudder, (dr. alch.).

Rio Pacaya, Peru, VII, 1912, 1 ♀, [A. N. S. P.].

Contamano, Rio Ucayali, Peru, X-XII, 1912, 3 ♂, 2 ♀, [A. N. S. P.], (dr. alch.).

***Conocephalus fasciatus fasciatus* (DeGeer)⁴⁶**

1773. *Locusta fasciata* De Geer, Mém. l'Hist. Ins., iii, p. 458, pl. 40, fig. 4. [Pennsylvania.]

This species has been widely confused in studying tropical American material with the allied but distinctive *C. cinereus*, and with the very different *C. saltator*. Careful study of the very

⁴⁴ The finding of a specimen on strand vegetation, from which spot we have an example of *C. spinosus*, is not surprising. *C. spinosus* has been taken in salt marsh at Coronado Beach, California, a few feet from grasses and strand plants where *C. fasciatus vicinus* is to be found. The present species supplants *C. f. fasciatus* and its race and is found under similar local environmental conditions.

⁴⁵ Recorded by Rehn as *X. fasciatum*, Proc. Acad. Nat. Sci. Phila., 1905, p. 826, (1906).

⁴⁶ For a more detailed discussion of the present species, vide Rehn and Hebard, Trans. Am. Ent. Soc., xli, p. 170, (1915).

large series of these species before us shows conclusively, that the present insect is found only in North America southward through northern Mexico on the Gulf coast as far as Vera Cruz, and also on the island of Bermuda. With no material of the genus from northern Mexico, we are unable to state how far southward the ranges of *fasciatus fasciatus* and *fasciatus vicinus* extend, though both races occur along the Mexican boundary. The single small specimen from Vera Cruz, in the fairly large series of the genus from that region before us, would suggest that the species is not found farther south. Study of the Bermudan fauna shows *fasciatus* s.s. to be the sole representative of the genus on that island, one male and three females before us not differing at all from typical material of the species.

Under *cinereus* and *saltator* the frequent misconceptions of the present species are discussed. Normally the form of the lateral lobes of the pronotum in *fasciatus* s.s. and *fasciatus vicinus* is particularly distinctive when compared with that of the other American species of the genus.

Vertex not strongly but distinctly ascending. Fastigium of vertex fully to very slightly more than two-thirds the width of the proximal antennal joint, narrowing with a distinct but very weak concavity to facial suture, when seen from front about one and one-half times as deep as greatest width. Eyes decidedly small. Lateral lobes of pronotum rather narrow, cephalic margin evenly and distinctly convex to the rather broadly rounded ventro-caudal angle,⁴⁷ thence weakly but distinctly convex to the distinct humeral sinus; convex callosity moderately broad. Tegmina always macropterous in typical *fasciatus*, varying to semi-brachypterous in the western race *fasciatus vicinus*, in which race this condition is the normal. Male cerci rather short and stout, mesal portion very slightly larger than proximal portion, with a very broad and heavy mesal (vertical) internal tooth which is perpendicular to the shaft of the cercus and directed interno-mesad with sharp thorn-like apex weakly decurved. In both races of

⁴⁷ Variation occurs in which this margin becomes weakly concave before reaching the ventro-caudal angle and, in such specimens, the ventro-cephalic angle is in consequence weakly indicated and the form of the lateral lobes more similar to the general type found in the species of the present subgenus.

fasciatus the abdomen, particularly in males, is distinctly tris-triate, which contrasts strongly in that sex with the green cerci.⁴⁸

In addition to nearly one thousand recorded specimens which have been recently examined by us, we here record a single female.

Vera Cruz, Vera Cruz, Mexico, XII, 1887, (L. Bruner), 1 ♀, (Hebard Cln.).

Conocephalus ictus (Scudder) (Pl. XXII, figs. 3, 13 and 20; XXIII, 7, 8 and 9; XXIV, 3.)

1859. *X[iphidium] mexicanum* Saussure, Rév. et Mag. de Zool., 2^e ser., xi, p. 208. [Mexico].

1875. *Xiphidium ictum* Scudder, Proc. Bost. Soc. Nat. Hist., xvii, p. 461. [Mexico; Guatemala].

Saussure's name, *Xiphidium mexicanum*, based upon macrop-terous examples of this species,⁴⁹ is unfortunately not available at the present day; the present use of the name *Conocephalus* for the genus then called *Xiphidium* prevents the use of his specific name, as on the same page of the work in which the present species is described, and having line priority, we find *Conocephalus mexicanus* described, which species is now placed in the genus *Neoconocephalus*. Scudder described brachypterous examples of the same species as *Xiphidium ictum*, which specific name must be used as the first available for the species.

The position of the present insect is between *C. cinereus* and *C. spinosus*, from both of which species it differs decidedly in general appearance; the males suggesting very heavy and deeply colored males of *C. strictus*, while the females suggest, to some degree, large and very heavy examples of that sex of *C. brevipennis*. From *cinereus* this species differs in the much more robust structure, more truncate form, normally broader vertex, decidedly more quadrate lateral lobes of the pronotum and decidedly larger tympanum of the male tegmina with much longer stridulating vein. The male cerci of the two species are

⁴⁸ In life, certain species of the genus have the cerci green; this excellent character can not be used for dried material as the green coloration often fades or even completely disappears in drying.

⁴⁹ We have before us a brachypterous male specimen taken by Sumichrast in Mexico, received from Saussure and identified by him as his *X. mexicanum*, probably originally from the same series on which Scudder's name is in part based.

quite similar, the ovipositor of *ictus* is of the normal type but averages decidedly longer and distinctly broader than in *cinereus*. When compared with *spinosus* the present species is found to differ in the more robust structure, much more truncate form, very much more quadrate lateral lobes of the pronotum, longer stridulating vein of male tegminal tympanum, different coloration and very different genitalic characters of both sexes. The species is decidedly variable in several usually very constant characters for the species of the genus.

Size medium to large, form very robust. Vertex not strongly but distinctly ascending. Fastigium of vertex broad, greatest width fully that of proximal antennal joint,⁵⁰ one and one-half times as deep as wide, narrowing with a distinct concavity to facial suture. Eyes of medium size, moderately protruding. Lateral lobes of pronotum rather broad, cephalic margin straight to the broadly rounded ventro-cephalic angle, then straight and more nearly horizontal than usual to the sharply rounded nearly rectangulate ventro-caudal angle, caudal margin distinctly but weakly convex to the shallow humeral sinus, convex callosity moderately broad and distinct. Tegmina normally semi-brachypterous, reaching distal extremity of male abdomen and covering about two-thirds of female abdomen, broad, with distal portion narrowing rather sharply and immediate apex sharply rounded. We have before us several specimens in which the tegmina are unusually truncate and in these the immediate apex is very broadly rounded. Rarely specimens are macropterous. Male tegminal tympanum very large, not elongate, stridulating vein

⁵⁰ A series of four ♂, one ♀ and one juv. ♀ from Texolo, Vera Cruz, Mexico, have the vertex unusually narrow, two-thirds the width of the proximal antennal joint in the males and about four-fifths the width of the same in the females, with sides, as would be expected, less concave. The specimens are otherwise inseparable from other smaller individuals of the species.

unusually long with veins prominent. Male cerci⁵¹ as in *cinereus* (*vide* key). Subgenital plate with distal margin truncate between the rather long disto-lateral styles (these .7 mm. in length). The caudal femora are heavy, with genicular areas usually very dark in color; the genicular lobes are normally bispinose; the ventro-external margins of the caudal femora are armed in the eighty-nine perfect specimens before us as follows:

Number of spines,	0-0	0-1	1-1	1-2	1-3	1-4	2-2
Number of specimens,	12	6	2	5	7	1	1
Number of spines,	2-3	2-4	2-6	3-3	3-4	3-5	4-4
Number of specimens,	16	3	1	7	6	3	6
Number of spines,	4-5	4-6	4-7	5-5	5-6	5-7	
Number of specimens,	4	2	1	2	3	1	

The series of 12 specimens with these margins unarmed are from the State of Vera Cruz; the great majority having more than eight spines in all are from Lower California.

The large series before us shows variability in size, vertex, lateral lobes of pronotum, tegmina and particularly apex of the same, male cerci, ovipositor length, coloration of genicular areas of the caudal femora and armament of the ventro-external margins of the same; which is convincing evidence that the present insect is one of the most plastic of the American species of the genus.

Measurements (in millimeters) of extremes

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
San José del Cabo,					
Lower California	13-14.5	3.6-4.2	8.3-11.4	11.6-14.2	1.7-1.9
Tepic, Mexico...	14.3	3.8	16.8*	13.2	1.7
Orizaba, Mexico.	12.4-15.4	3.6-4.1	8.2-9.3	11.6-14.6	1.6-1.8
Medellin, Mexico	13.7	3.7	7.9	13	1.7

⁵¹ The entire series of males before us from Lower California and Tepic, Mexico, have the distal portion of the cercus somewhat wider than normal with apex more broadly rounded (though not nearly as broadly rounded as in *C. spinosus*). No other noteworthy variation occurs in the series and, as we have found that in eastern Mexico there is occasionally a marked contrast in the degree of production and narrowness of the distal portion of the cercus, we do not consider that sufficient differentiation has taken place to warrant the recognition of a western geographic race.

A male before us from Santa Rosa, Mexico, has the distal portion of the cercus unusually produced for the species and narrowing decidedly to the very sharply rounded apex. In a single specimen of the very large series of *C. brevipennis* before us, a similarly unusual development has occurred.

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
Santa Rosa, Mexico.....	15.5	4.2	19.9*	15.7	1.9
La Zacualpa, Mexico.....	15.5	3.7	15.2*	13.9	1.9
Tonala, Mexico.	14.5	3.8	17.8*	13.8	1.8
Cacao Trece Aguas, Guate- mala	11.8-15	3.3-3.8	6-8.3	12.2-13.6	1.6-1.8
San Marcos, Nic- aragua	13-14.3	3.3-3.7	7.3-8.6	12-12.6	1.7-1.8
♀					Length of ovipositor
San José del Cabo, Lower California	12-15.3	3.7-4.3	8.8-19.1*	14-15.3	12.5-13.9
Orizaba, Mexico.	13-13.3	3.3-3.7	6.3-6.5	12.9-13.2	10.6-12
Jalapa, Mexico..	12.7	3.7	5.9	12.8	9.3
Medellin, Mexico	13-18	3.7-3.9	5.8-6.3	13-14.7	10.1-12.8
Secanquin, Guate- mala.....	13.7	3.8	4.8	12.5	10.3
San Marcos, Nicaragua....	14-16	3.7-3.8	6.8-8	13.7-13.9	12-12.3

Of the four males and one female which are macropterous and are marked with an asterisk above, the length to the apex of the wing is 20.6, 24.8, 19.9, 23.3 and 24.3 mm. respectively.

In coloration the present species has the medio-longitudinal stripe of head and pronotum very striking; shining and very dark blackish brown, usually very narrowly margined with yellowish. The general coloration is pale green. The male sex has the ventro-proximal portion of the abdomen green, the concealed portion argus brown bilineate dorso-laterad with buff, the entire distal portion including the cerci uniform tawny, varying in different examples to ochraceous tawny. In females the abdomen is suffused with brown dorsad, bilineate with a paler shade dorso-laterad.

The species is not known from without the range defined by the localities given below.

In addition to a number of specimens previously recorded as this species or as the synonymous *X. mexicanum*, we here record the following series of 103 specimens; 43 males, 46 females, 4 immature males and 10 immature females.

San José del Cabo, Lower California, Mexico, 19 ♂, 18 ♀, 3 juv. ♂, [Hebard Cln.], (1 ♀ macr., 1 ♀ semi-macr., all dr. alch.).

Tepic, Tepic, Mexico, 2 ♂, 1 ♀, [Hebard Cln.], (1 ♂, macr., all dr. alch.).

Venis Mecas, Mexico, I, 6, 1878, (E. Palmer), 1 ♀, [M. C. Z.].

Jalapa, Vera Cruz, Mexico, VI, 1894, 1 ♂, 1 ♀, [Hebard Cln.], (dr. alch.).

Cordoba, Vera Cruz, Mexico, VI, 11 and 12, (F. Knab), 1 ♂, 1 ♀, 2 juv. ♀, [U. S. N. M.].

Orizaba, Vera Cruz, Mexico, I, 1892, 2 ♀, [Hebard Cln.].

Medellin, Vera Cruz, Mexico, IX to XI, 1895, (L. Bruner), 1 ♂, 5 ♀, [Hebard Cln.].

Otoyac, Vera Cruz, Mexico, XI to XII, 1887, (L. Bruner), 2 ♂, 2 ♀, [Hebard Cln.].

Santa Rosa, Vera Cruz, Mexico, VIII, (Wm. Schaus), 1 ♂, [Hebard Cln.], (macr.).

La Buena Ventura Plantation, near Santa Rosa, Vera Cruz, Mexico, VII, 13, 1909, (A. Petrunkivitch; swept from grasses), 1 ♀, [Am. Mus. Nat. Hist.].

Cuernavaca, Morelos, Mexico, VII, 7, 1900, 5000 ft., (C. C. Deam), 1 ♀, [U. S. N. M.], (dr. alch.).

Cuautla, Morelos, Mexico, VII to VIII, 3, 1903, (W. L. Tower), 4 ♂, 5 ♀, 5 juv. ♀, [Am. Mus. Nat. Hist.].

Jojutla, Morelos, Mexico, VIII, 6, 1903, (W. L. Tower), 2 ♂, 2 ♀, [Am. Mus. Nat. Hist.].

Matamoros, Morelos, Mexico, VIII, 12, 1903, (W. L. Tower), 1 ♂, [Am. Mus. Nat. Hist.].

Tonala, Chiapas, Mexico, VIII, 1, 1909, (A. Petrunkivitch), 1 ♂, [Am. Mus. Nat. Hist.], (macr.).

La Zacualpa, Chiapas, Mexico, VIII, 11, 1909, (A. Petrunkivitch), 1 ♂, [Am. Mus. Nat. Hist.], (macr.).

Secanquin, Guatemala, IV, 14, 1905, (A. McLachlan), 1 ♂, 1 ♀, 2 juv. ♀, [U. S. N. M.], (dr. alch.).

San Felipe, Retalhuleu, Guatemala, II, 23, 1905, 1 ♀, [U. S. N. M.], (dr. alch.).

Cacao Trece Aguas, Alta Vera Paz, Guatemala, III, 24 and IV, 25, (Schwarz and Barber), 4 ♂, 1 juv. ♂, 1 juv. ♀, [U. S. N. M.].

Quirigua, Izabal, Guatemala, II, 1912, (W. P. Cockerell), 1 ♀, [U. S. N. M.], (dr. alch.).

San Marcos, Nicaragua, (C. F. Baker), 2 ♂, 2 ♀⁵² [A. N. S. P. and Morse Cln.].

Conocephalus spinosus (Morse)⁵³

1901. *Xiphidium spinosum* Morse, Can. Ent., xxxiii, p. 201. [Coronado, California.]

⁵² Recorded by Rehn in Baker as *X. propinquum* and there also queried by Morse as *X. gossypii*, Invertebr. Pacifica, i, p. 78, (1905).

⁵³ For further data on this species see Rehn and Hebard, Trans. Am. Ent. Soc., xii, p. 180, (1915).

When compared with its nearest relative, *C. fasciatus*, the present species is found to differ in the more robust form, wider vertex, larger (normal) eyes, differently shaped lateral lobes of the pronotum and very narrow convex callosity of the same, immaculate abdomen with distal portion pale yellow (in males this coloration including the cerci and showing in this respect a greater similarity to *C. cinereus*), heavier and decidedly longer cerci with straight distal portion broader and very decidedly depressed for a much greater distance, ventro-external margins of the caudal femora bearing normally a number of heavier spines and ovipositor which is heavier and differs in outline from all other American species in being noticeably widest meso-distad.

Vertex weakly ascending. Fastigium of vertex as wide as proximal antennal joint, narrowing with a decided concavity to facial suture, when seen from front about one and one-third times as deep as wide. Lateral lobes of pronotum deep, cephalic margin straight, ventro-cephalic angle broadly rounded, ventral margin straight and oblique to the sharply rounded ventro-caudal angle, caudal margin sinuous and nearly perpendicular to the distinct humeral sinus. Cercal tooth much as in *fasciatus* but situated relatively proximad, this due to the elongation of the mesal and distal portions of the cercus in the present species. The genicular lobes of the caudal femora are normally bispinose; the genicular areas are not darkened; the ventro-external margins of the caudal femora are armed in the eight perfect specimens from lower California before us as follows:

Number of spines,	2-2	2-3	2-4	3-3	3-4	4-4	4-6
Number of specimens,	1	1	1	1	2 ⁵⁴	1	1

The above material agrees fully with the types except that the specimens average in all proportions somewhat larger. The single specimen, recorded below from Costa Rica, is perfectly typical except that the ventro-external margins of the caudal femora are unarmed.

⁵⁴ One of these specimens bears a single spine on one of the ventro-internal margins of the caudal femora.

Measurements (in millimeters) of extremes
 San José del Cabo, Lower California, Mexico

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus	Length of ovipositor
♂	14.9-16.6	3.4-3.8	16.8-21.1	13.6-13.9	2.2-2.3
♀	13-16.7	3.2-4	18.3-22.8	13.6-15.3	9.5-10.1

Puntarenas, Costa Rica

♂	14.9	3.3	14.3	13.2	2
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The present species is now known on the Pacific coast from Coronado Bay, California, to Puntarenas, Costa Rica. It is a halophytic insect, the only species of the genus known as yet from the salt marshes of the Pacific coast.

In addition to 10 recorded specimens which have been recently examined by us, we here record the following series of 11 specimens; 6 males and 5 females.

San José del Cabo, Lower California, Mexico, 5 ♂, 5 ♀, [Hebard Cln., (dr. alch.).

Puntarenas, Costa Rica, II, 1907, (P. Biolley; strand, on leaves of *Ipomaea*), 1 ♂, [A. N. S. P.].

Conocephalus insularis (Morse) (Pl. XXII, fig. 14; XXIII, 10 and 11; XXIV, 4.)

1905. *Xiphidium insularis* Morse, Psyche, xii, p. 20. [Stranger Cay, Bahama Islands].

The present insect is, as stated by Morse, closely allied to *C. gracillimus*, but differs from that species in the wider and less produced vertex (width of same two-thirds that of proximal antennal joint), broader and decidedly shallower lateral lobes of the pronotum which causes the ventro-cephalic angle to become more prominent,⁵⁵ slightly less attenuate form and proportionately shorter limbs. As in the other species of group C, *gracillimus* and *iriodes*, the convex callosity of the lateral lobes of the pronotum is very broad. A semi-macropterous form is present in this species, which is found to grade without a break into a very

⁵⁵ "Distinctly polygonal in outline instead of triangular," Morse, (in comparison with *C. gracillimus*). This is rather too brief, for, although the lateral lobes of the pronotum in *gracillimus* show a nearer approach to a triangular form, the ventro-cephalic angle is distinct in that species also, though very broadly rounded.

strongly macropterous condition. Only a strongly macropterous phase has been found in *gracillimus*. In darker specimens the abdomen is strikingly marked as in *gracillimus* with three narrow dark bands, one mesal and the others lateral, the two intervening spaces forming usually bright yellow bands. In such specimens the lateral lobes of the pronotum are usually marked mesad with a diffused dark postocular stripe. The cerci are of the same form as in *gracillimus* and bright green in coloration during life. The genicular lobes of the caudal femora are normally bispinose; the genicular areas are not darkened; unlike *gracillimus* the ventro-external margins are often armed with one to three very small spines, in the series of thirty-four perfect specimens before us 20 being armed as follows:

Number of spines,	0-1	0-2	1-1	1-2	2-2	2-3
Number of specimens,	10	2	2	3	1	2

Of twenty-four Cuban specimens before us sixteen are macropterous to varying degrees, while the entire series of thirteen examples from Jamaica are semi-macropterous.

Of the two species of the genus found in both Cuba and Jamaica, this insect is much the less numerous, being found rarely and then in small numbers in open areas of short grass. The species is now known from Nassau, New Providence Island, Mangrove Cay and Stranger Cay, Bahamas; Cuba; Hayti and Jamaica.

In addition to the type, a macropterous male, we have examined the following series of 43 specimens; 28 males, 10 females, 2 immature males and 6 immature females.

Guane, Pinar del Rio, Cuba, IX, 24 to 26, 1913, (F. E. Lutz), 2 ♂, [Am. Mus. Nat. Hist.], (macr.)

North of Viñales, Pinar del Rio, Cuba, IX, 16 to 22, 1913, (F. E. Lutz), 4 ♂, 1 ♀, 2 juv. ♀, [Am. Mus. Nat. Hist.], (2 ♂, 1 ♀, macr.).

Pinar del Rio, Pinar del Rio, Cuba, IX, 9 to 24, 1913, (F. E. Lutz), 7 ♂, 1 ♀, [Am. Mus. Nat. Hist.], (4 ♂, 1 ♀ macr.).

Cabañas, Pinar del Rio, Cuba, IX, 5 to 8, 1913, (F. E. Lutz), 2 ♂, [Am. Mus. Nat. Hist.], (1 ♂ macr.).

Havana, Cuba,⁵⁶ (C. F. Baker), 2 ♂, [A. N. S. P.]; I, 23, 1904, (Hebard), 1 ♂, [Hebard Cln.], (1 macr.).

Jesus del Monte, Havana, Cuba, I, 23, 1904, (Hebard), 1 juv. ♂, 1 juv. ♀, [Hebard Cln.].

⁵⁶ The macropterous specimen was recorded as *X. fasciatus* (in part) and the semi-macropterous specimens as *X. brevipennis* (in part) by Rehn, Cent. Exp. Sta. Rept. Cuba, p. 216. (1909).

Cayamas, Oriente, Cuba, III, 7 to VI, 10, (E. A. Schwarz), 3 ♀, [U. S. N. M.], (macr.).

Cristo, Oriente, Cuba, X, 3, 1913, (F. E. Lutz), 1 juv. ♀, [Am. Mus. Nat. Hist.].

Baracoa, Oriente, Cuba, (A. Busck), 1 ♀, [U. S. N. M.], (macr.).

San Domingo, (M. A. Frazer), 1 ♀, [M. C. Z.].

Montego Bay, Jamaica, III, 6, 1911, 1 ♂, [A. M. N. H.]; X, 29, to XI, 3, 1913, (Hebard; scant grasses on hillside near forest), 5 ♂, 1 juv. ♂, [Hebard Cln.].

Kingston, Jamaica, X, 23, 1913, (Hebard; grassy pasture), 1 ♂, 1 ♀, [Hebard Cln.].

Stony Hill, Jamaica, X, 25, 1913, (Hebard; grasses in opening of forested hills), 1 ♀, 2 juv. ♀, [Hebard Cln.].

Hope Gardens, Jamaica, X, 23, 1913, (Hebard; grassy pasture), 3 ♂, 1 ♀, [Hebard Cln.].

Conocephalus iriodes⁵⁷ new species (Pl. XXI, fig. 6; XXII, 5 and 23; XXIII, 12 and 13; XXIV, 5.)

This insect with *C. gracillimus* and *C. insularis* forms a group (E) of the subgenus *Xiphidion* agreeing in the slender form, broad convex callosity of the lateral lobes of the pronotum, elongate male tegminal tympanum and distinctive color pattern. The present species resembles *insularis* somewhat the more nearly, agreeing with that species in the form of the vertex, but having the ventro-cephalic angle of the lateral lobes of the pronotum less pronounced (as in *gracillimus*). The coloration of *iriodes* is normally much more intense than in either of the above species, the tympanum of the male tegmina even more elongate, while the male cerci are very different, showing a distinct resemblance to the similar but more decidedly specialized type found in the otherwise different and distinctive *C. angustifrons*.

Type: ♂; Kaiteur, British Guiana. July 31, 1911. (F. E. Lutz.) [American Museum of Natural History.]

Description of Type.—Size medium, form slender, coloration distinctive. Head with dorsum of vertex, when seen from lateral aspect, weakly but distinctly ascending above the plane of the occiput (much as in *insularis*). Fastigium of vertex approximately two-thirds the width of basal antennal joint, narrowing with a distinct concavity to facial suture, when seen from front approximately twice as deep as wide. Eyes moderately large, not unusually protruding. Lateral lobes of pronotum vertical, cephalic margin broadly convex to the ventro-caudal angle which is very sharply rounded, caudal margin weakly convex to the broad and shallow humeral sinus, convex callosity very broad. Tegmina elongate and slender, narrowing decidedly to sharply rounded apex,

⁵⁷ From *ιριώδης*=like the rainbow, in allusion to the strikingly beautiful iridescence of the wings and transparent portions of the male tegminal tympanum.

tympanum very elongate (decidedly more longitudinal than in *gracillimus* or *insularis*), veins and veinlets of tegmina decided; wings more than usually narrow. Cerci heavy and not very elongate (decidedly shorter than in *insularis*, a little longer than in *C. fasciatus*), with mesal portion not contrastingly swollen, armed with a heavy mesal (vertical) tooth, which is flat and broad at the base, situated interno-mesad and directed slightly cephalad of perpendicular to shaft, distal third of cercus showing a distinct but weak outward curvature with broadly rounded apex briefly but decidedly depressed. Subgenital plate with distal margin weakly but distinctly convex between the short disto-lateral styles. Cephalic and median limbs as in *insularis*, caudal limbs similar to those of that species (swollen proximal portion narrowing more abruptly and decidedly than in *gracillimus*), with genicular lobes bispinose but with ventral margins unarmed. Caudal tibiae with the three pairs of distal spurs small, the dorsal pairs and interno-ventral spurs being only slightly heavier than the larger tibial spines.

Allotype: ♀; data same as type but taken August 7, 1911.

Description of Allotype.—Very similar to type with little difference in size. Tegmina similar with exception of sexual differences. Ovipositor very similar to that of *insularis*, short, very slender, virtually straight but with distal third having a very weak upward curvature. Subgenital plate flat, with lateral margins turned upward roundly but sharply and embracing the base of the ovipositor, brief distal margin of flat surface transverse.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
Kaiteur, British Guiana, Type	15.2	3	16.1	12.1	1.8
Kaiteur, British Guiana, Paratypes	14-14.7	3.1-3.3	15.2-16.4	12.4-13.2	1.6-1.7
Rockstone, British Guiana	13.7	3.2	16	12.9	1.7
♀					Length of ovipositor
Ciudad Bolivar, Vene- zuela	14.5	3.3	19.3	14	7.9
Maripa, Rio Caura, Venezuela	14	3.2	17.2	13.2	7.6
Kaiteur, British Guiana, Allotype	13	3.3	16.3	12.7	7.4
Ireng River near Ror- aima, Brazil	13.2	3	16.2	12.8	7.3
Bonito, Pernambuco, Brazil	14.6	3	18.7	13.4	7.8

Coloration.—♂. Head and pronotum burnt lake, with the exception of the occiput and dorsum of the pronotum, which have the medio-longitudinal stripe very deep burnt lake and the remaining portions buff yellow. Eyes prussian brown varying to cinnamon in different individuals. Tegmina infuscated, with veins shamrock green, hyaline areas of tympanum iridescent; wings with hyaline portion iridescent and with costal margin and brief distal exposed (when at rest) portion rather strongly infuscated. Abdomen buff yellow considerably infuscated, with broad median and lateral stripes of burnt lake, cerci burnt lake. Limbs tawny, washed with burnt lake.

♀. Head, lateral lobes of pronotum (below a very narrow postocular stripe of burnt lake) and femora shamrock green somewhat infuscated. The buff yellow lateral margins of the burnt lake medio-longitudinal stripe of the occiput and dorsum of the pronotum are decidedly broader than in the male, on the pronotum extending over the dorsal portions of the lateral lobes. Tegmina, including veins, infuscated; wings as in the male. Abdomen colored much as in that sex. Tibiae and ovipositor hazel, weakly suffused with greenish.

The Venezuelan females are the palest examples before us and lack dark markings on the lateral lobes of the pronotum, while the dark abdominal stripes are greatly reduced in breadth.

Specimens Examined: 9; 4 males and 5 females.

Ciudad Bolívar, Venezuela, IX, 1909, (M. A. Carriker, Jr.), 1 ♀, [A. N. S. P.].

Maripa, Rio Caura, Venezuela, X, 1909, (M. A. Carriker Jr.), 1 ♂, [A. N. S. P.].

Ireng River near Roraima, Brazil, VIII, 9, 1911, (Crampton), 1 ♀, *paratype*, [Hebard Cln.].

Kaiteur, British Guiana, VII, 31 to VIII, 7, 1911 (F. E. Lutz), 3 ♂, 1 ♀, *type*, *allotype*, *paratypes*, [A. M. N. H.].

Rockstone, British Guiana, VII, 8, 1911, (Crampton and Lutz), 1 ♂, *paratype*, [A. M. N. H.].

Bonito, Province of Pernambuco, Brazil, VII, 1883, (A. Koebele), 1 ♀, [U. S. N. M.], (dr. alch.).

Conocephalus angustifrons (Redtenbacher) (Pl. XXII, figs. 6 and 15; XXIII, 14 and 15; XXIV, 6.)

1891. *Xiphidium angustifrons* Redtenbacher, Verh. Zool.-Bot. Gesell. Wien, xli, p. 524. [Santa Fé de Bogota and Tolima, Colombia.]

The present insect bears a close general resemblance to the brachypterous condition of *C. saltator*, but may be readily sep-

arated by the very different fastigium of the vertex, coloration (which in life is probably very distinctive and in dried specimens before us is still striking in the male sex and in a few of the females), larger and more bulging eyes and male cerci which are very different from any other South American species, being of the type found in *C. brevipennis*, but differing from that species in proportions, contour of apical portion and external instead of mesal position of apex.

The ventro-cephalic margins of the cephalic and median tibiae are also distinctive in having, in every specimen before us, from one to the four of these margins armed with seven instead of the normal six spines⁵⁸; this is never found in *saltator* in the regions where the distribution of the two species is coextensive,⁵⁹ in which regions the ovipositor of the present species also averages distinctly shorter.

The species agrees in width of vertex with *C. versicolor* but is otherwise very different. Giglio-Tos considered his *X. festae*⁶⁰ (= *versicolor*) more nearly related to the present species than we find is the case after study of all the American species.

Size medium, form very robust, coloration unusual. Fastigium of vertex narrow and strongly ascending above plane of occiput but not unusually produced, greatest width slightly less than one-half that of proximal antennal joint, two and one-half times as deep as wide, narrowing very slightly to facial suture. Eyes large and protruding. Lateral lobes of pronotum of moderate width, cephalic margin straight to the broadly rounded ventro-cephalic angle, then straight to the narrowly rounded ventro-caudal angle, caudal margin weakly concave and often subsinuate, humeral sinus exceedingly weak or wholly absent, convex callosity exceedingly narrow but distinct. Tegmina normally

⁵⁸ The careful work of Giglio-Tos is shown by his remarks on this less noticeable differentiation, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 232, p. 29, (1896); a character which had been wholly overlooked by Redtenbacher.

⁵⁹ Four depauperate brachypterous individuals of *C. saltator* from Dominica and Trinidad agree in this respect, and represent the only specimens of the subgenus *Xiphidion* which possess a supplementary seventh spine, excepting material of *C. angustifrons*; moreover such depauperate females from those islands have the ovipositor length quite as short as in the present species.

⁶⁰ Boll. Mus. Zool. Anat. comp. Univ. Torino, xiii, no. 311, p. 93, (1898).

abbreviate, lanceolate, with apex sharply rounded.⁶¹ Male tegminal tympanum unusually small, short and broad, with veins prominent. Cerci short, proximal two-thirds heavy with mesal (vertical and longitudinal) internal tooth heavy at base, directed mesad and perpendicular to the shaft of the cercus, distal third of cercus directed strongly outward with broadly rounded apex external instead of mesal in position, this third decidedly flattened and slanting toward the internal margin with the flattened portion merging with the proximal swollen portion gradually, much more evenly than in *brevipennis*. Subgenital plate with distal margin truncate between the very short distolateral styles, which are set in slightly but appreciably raised sockets. Cephalic and median tibiae with from one to all of the ventral margins bearing seven, instead of the normal six, spines. Caudal femora heavy and elongate, bearing on their ventro-external margins spines which are heavier than is usual. Ovipositor short, very weakly curved and virtually straight.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
♂					
Juan Viñas, Costa Rica	13-14	3.3-3.6	8.2-9.4	12.7-12.8	1.6-1.7
Rio Grande, Costa Rica	13-14	3.3-3.6	8.2-8.6	12.3-12.4	1.7-1.8
San José, Costa Rica .	12.7	3.4	8.8	13	1.8
♀					Length of ovipositor
Juan Viñas, Costa Rica	12	3.3	7.1	13.3	8.9
Rio Grande, Costa Rica	15	3.7	8.6	13.7	9.3
Carillo, Costa Rica ..	16	3.9	8.7	14.6	10
Carillo, Costa Rica ..	15	3.6	15.9	14.8	9.6
San José, Costa Rica .	11.5	3.3	7	12.4	8.6
Cincinnati, Colombia	12.8-14.2	3.3-3.4	6.5-6.9	12-13.1	8-9.6
La Combre, Colombia	15	3.4	7.6	13.7	8.6

⁶¹ The single macropterous specimen of the species known, has the tegmina moderately broad, as in the macropterous condition of *C. saltator*, with apex not quite as narrowly rounded as in the brachypterous condition.

Color Notes.—Males. Head, pronotum, thorax, tegmina and base of abdomen forest green; the medio-dorsal stripe of head and pronotum brownish olive and weakly defined with no trace of pale lateral coloration. Eyes dark brown. All femora tawny, genicular areas of caudal femora deep bay, tibiae tawny strongly washed with green. All of abdomen excepting basal portion mahogany red, cerci of the same color. In the females the coloration is less intense, the abdomen being decidedly less vivid.⁶²

The perfect material before us shows the following armament of the ventro-cephalic margins of the cephalic and median tibiae:

Number of spines,	6-6	6-7	7-7	7-8
Specimens with cephalic tibiae so armed,	0	4	12	1
Specimens with median tibiae so armed,	6	8	3	0

Two specimens of this series have one of the ventro-caudal margins of the cephalic tibiae armed with but five spines, while one individual has the ventro-caudal margin of one of the median tibiae armed with seven spines.

The genicular lobes of the caudal femora are normally bispinose, a single specimen in the series before us has one of these lobes unispinose. The ventro-external margins of the caudal femora are armed in the seventeen perfect specimens before us as follows:

Number of spines,	1-2	2-3	2-4	3-3	3-4	3-5
Number of specimens,	1	2	1	5	4	1
Number of spines,	4-4	4-5	4-7			
Number of specimens,	1	1	1			

The present species is known from Punta di Sabana and Colon, Panama, in addition to the original localities and those given below. It appears to be generally distributed at somewhat higher elevations than *saltator*. The coloration suggests to us the possibility of the insect being an inhabitant of the luxuriant vegetation in and about the forests rather than the grasslands.

Specimens Examined: 19; 6 males, 11 females and 2 immature males.

San José, Costa Rica, 1160 meters elevation, (P. Biolley), 1 ♀; 1 ♂, [all Hebard Cln.].

Carillo, Costa Rica, VIII, to IX, 1903, (C. F. Underwood), 2 ♀, [Hebard Cln.], (1 macr.).

⁶² The females before us from South America are much discolored; such poorly preserved material is found to lose almost all traces of distinctive coloration.

Rio Grande, Costa Rica, III, 6, 1902, (M. Cary), 2 ♂, 1 ♀, 1 juv. ♂, [Hebard Cln.].

Juan Viñas, Costa Rica, III, 12, 1902, (L. Bruner), 3 ♂, 1 ♀, [Hebard Cln.]; VI, 28, 1909, (P. P. Calvert), 1 ♀, [A. N. S. P.].

Zent, Costa Rica, IX, 26, (F. Knab), 1 ♀, 1 juv. ♂, [U. S. N. M.].

Cincinnati near Santa Marta, Colombia, VII, 9 to 10, 1913, 4000 to 5000 ft., (M. A. Carriker Jr.), 3 ♀, [Hebard Cln.].

La Combre, Cordillera Occidentale near Cali, Colombia, V, 19, 1914, (H. S. Parish), 1 ♀, [A. N. S. P.].

Conocephalus unicolor (Bruner) (Pl. XXI, fig. 3.)

1915. *Conocephalus unicolor* Bruner, Ann. Carneg. Mus., ix, p. 374. (June.) [Corumbá, Brazil.] [Macropterous.]

1915. *Conocephalus recticaudus* Bruner, Ann. Carneg. Mus., ix, p. 374. (June.) (In part?) [Corumbá, Brazil.] [Brachypterous.]

This species, with *C. resacensis*,⁶³ forms group E of the subgenus *Xiphidion*, these species showing a distinct tendency toward the general form of the male cerci found in groups G, H and I. The present insect has this tendency somewhat the more pronounced, as may be observed by reference to the descriptions. In general appearance the specimens before us resemble large macropterous individuals of *C. cinereus*, but the somewhat narrower vertex, longer limbs, larger male tegminal tympanum, more ample lateral lobes of the pronotum, heavily armed ventro-external margins of caudal femora, distinctive male cerci and different ovipositor show how distinct the two species really are.

Description of ♂.—Size large, form graceful but with limbs and wings large and decidedly elongate. Head with dorsum of vertex, when seen from lateral aspect, not strongly but distinctly ascending above the plane of the occiput (much as in *cinereus*), fastigium of vertex slightly less than two-thirds the width of proximal antennal joint, nearly two and one-half times as deep as wide and narrowing with a very weak concavity to facial suture. Eyes moderately large and not unusually protruding. Lateral lobes of pronotum with cephalic margin straight to the very broadly rounded ventro-cephalic angle, then straight to the sharply rounded ventro-caudal angle (which is distinctly less than a right angle), caudal margin weakly convex to the broad and very shallow humeral sinus, convex callosity distinct and moderately broad. Tegmina elongate, slender, narrowing gradually to sharply rounded apex, veins and veinlets very delicate, tympanum large and distinctly longitudinal with veins pronounced, stridulating vein short with only proximal half decidedly swollen. Cerci elongate with proximal portion stout, mesal portion elongate and decidedly but evenly enlarged, at base (vertical and longitudinal) of mesal third is situated a large flattened internal horizontal tooth directed a little cephalad

⁶³ Described in, Trans. Am. Ent. Soc., xli, p. 188, (1915).

with immediate apex sharp and decurved, distal portion of cercus elongate, horizontally strongly depressed, lateral margins converging evenly and decidedly to sharply rounded apex. Subgenital plate with distal margin weakly convex between the short disto-lateral styles. Cephalic and median limbs well developed but with spination not unusually heavy. Caudal femora elongate with proximal portion decidedly swollen, ventro-external margins armed with a number of very small stout spines, genicular lobes strongly bispinose, genicular areas very weakly infuscated.

Description of ♀.—Very similar to type, size slightly larger. Tegmina similar to ♂ except for sex differences. Ovipositor⁶⁴ elongate, nearly straight but with a perceptible downward curvature.⁶⁵ Subgenital plate flat with lateral margins turned upward roundly and embracing the base of the ovipositor, very brief distal margin of flat surface transverse.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus	Length of ovipositor
Corumbá, Brazil						
♂	16.1	3.9	17	15.7	2.3	....
♀	17.4	3.9	18.9	17.1	....	16.4
♀	17.1	3.7	18.4	15.3	....	14.7

The other female before us has the lateral lobes of the pronotum distinctly shallower with the ventral margin distinctly less oblique, the specimen is however unquestionably conspecific.

The coloration of the species is not unusual, the general color being pale green (much faded in these specimens) with the medio-longitudinal stripe of head and pronotum subobsolete.⁶⁶ In the male sex the distal portion of the abdomen, including the cerci, is pale yellow brown; this is weakly indicated in the females. The genicular areas of the caudal femora are very briefly and weakly infuscated.

⁶⁴ In both females before us the dorsal valves of the ovipositor surpass the ventral valves by .7 mm. This is unusual in the genus but is probably of little value as a specific character.

⁶⁵ In the other topotypic female before us, the downward curvature of the ovipositor, though still suggested, is even less pronounced.

⁶⁶ In but one of the three decidedly faded specimens before us this stripe is indicated on the dorsum of the vertex, with margins alone defined by weak parallel lines on the pronotum.

In the three specimens before us the armament of the ventro-external margins of the caudal femora is 4-4, 4-5 and 5-6 spines.

The species is an inhabitant of the lowlands (probably marshes) of the upper Paraguay.

Specimens Examined: 3; 1 male and 2 females.

Corumbá, Brazil, III, (H. H. Smith), 1 ♂, 2 ♀, *topotypes*, [U. S. N. M. and A. N. S. P.].

Conocephalus equatorialis (Giglio-Tos) (Pl. XXIII, figs. 16 and 17.)

1898. *X[iphidium] equatoriale* Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, xiii, no. 311, p. 92. [Gualaquiza and San José, Ecuador.]

The present species finds nearest relationship in *C. saltator*, differing from macropterous examples of that species in the narrower vertex, darker coloration of the discoidal and anal fields of the tegmina and adjacent portions of the wings when at rest, more iridescent hyaline area of the wings, green or greenish cerci of similar general form but distinctly less specialized, and ovipositor which is normally shorter than in typical *saltator*. Furthermore the present insect is the only American species known to us which always has the ventro-internal margins of the caudal femora armed. In the examination of several thousand examples of other American species of the genus, but seven specimens, two *C. fasciatus fasciatus*, one *C. spinosus*, one *C. saltator* and three *C. attenuatus*, have been found by us bearing a single spine on one of the ventro-internal margins of the caudal femora.

Size medium to small,⁶⁷ form moderately slender. Fastigium of vertex narrow, greatest width slightly less than to slightly more than one-half⁶⁸ that of proximal antennal joint, two and one-half to two and three-fourths times as deep as broad, narrowing with scarcely any concavity to facial suture. Eyes moderately large, but slightly protruding. Cephalic margin of lateral lobes broadly convex to the ventro-caudal angle, with the ventro-cephalic angle very weakly indicated, ventro-caudal angle sharply rounded (distinctly less than a right angle), caudal margin nearly straight (very weakly convex) to the distinct but shallow humeral sinus, convex

⁶⁷ The typical series from Ecuador, of which a pair are in the Academy, averages decidedly smaller than the material here recorded and the tegmina of many specimens of that series are semi-macropterous.

⁶⁸ Material having this greatest width of vertex is from British Guiana, this does not appear to be the normal condition for the species.

callosity moderately broad.⁶⁹ Tegmina elongate, slender, narrowing evenly to the rather sharply rounded apex, male tympanum much as in *saltator*. The species is apparently normally macropterous, only occasional specimens being semi-macropterous over the greater portion of its range, but the type series demonstrates that in Ecuador a semi-macropterous condition is often found. Male cerci similar to those of *saltator* but not as elongate, the enlarged portion very slightly overhangs the base of the tooth and the margins of the distal portion are slightly convergent, thus making the apex rather sharply rounded. Subgenital plate with distal margin weakly convex between the rather long disto-lateral styles. Caudal femora much as in *saltator*, but with both ventro-external and ventro-internal margins armed; genicular lobes normally bispinose; genicular areas apically darkened; the ventro-external margins are armed in the thirty-one perfect specimens before us as follows:

Number of spines,	1-2	2-3	2-4	3-3	3-4	4-4
Number of specimens,	1	1	2	1	9	7
Number of spines,	4-5	4-6	5-3	5-5	5-6	
Number of specimens,	6	1	1	1	1	

The ventro-internal margins of the caudal femora are also armed, as follows:

Number of spines,	0-1	0-2	1-1	1-2	1-3	2-2
Number of specimens,	9	1	7	11	1	2

The ovipositor is short, slender and usually almost straight.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
Rio Mato, Venezuela	13.2-14	3.3-3.5	13.9-19.6	13.3-14	1.8-1.9
Bartica, British Guiana.....	12.6-15.5	3-3.4	13.9-17.1	12.8-13.9	1.8-1.9

⁶⁹ In the original description, Giglio-Tos states that the convex callosity is narrow; it is narrow, but when compared with the other American species we can but describe it as we have done above. The shades of meaning for such characters are very difficult to express and uniformity is difficult to maintain even in one and the same paper.

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
Contamano, Peru..	13.5	3.4	19.2	13.9	1.9
Gualaquiza, Ecuador, paratype	11	2.9	12.2	....	1.7
♀					Length of ovipositor
Rio Mato, Vene- zuela	14	3.3	18.7	14	7.4
Bartica, British Gui- ana	13-14.5	3.3-3.7	18.7-19	13.4-14.2	7.2-8 ⁷⁰
Contamano, Peru..	13.8-14.2	3.3-3.4	19-19.5	13.9-14.7	7.7-7.9
Gualaquiza, Ecuador, paratype	12	3	13.3	12.4	7.2 ⁷¹

A female before us from Perené, Peru, has the ovipositor length 8.3 mm.

We have thought it best to give the measurements of the two paratypes before us from Ecuador, for although inseparable from the other specimens here recorded, they, and as is shown by Giglio-Tos in his description, the entire series from Ecuador, are decidedly smaller with shorter tegmina. This variation may, however, be due rather to local environmental conditions than to purely geographic influences.

The type series is dried alcoholic, fresh material before us shows the following coloration. Male: Head and pronotum (excepting the very dark medio-dorsal brownish black stripe), thorax, exposed portions of the five proximal dorsal abdominal segments, entire ventral surface of abdomen, cerci, subgenital plate, cephalic and median limbs and bases of caudal femora, lettuce green. Proximal (concealed) portion of dorsum of abdomen dark brown mesad, bordered laterad with yellowish, distal four dorsal segments of abdomen and adjacent portions of caudal femora ochraceous orange fading gradually into the green portions. Tegmina

⁷⁰ A single female in this series has the ovipositor unusually long, 9.9 mm. in length.

⁷¹ Giglio-Tos gives 7.5-8 mm. as the extremes of ovipositor length in the type series. Our measurement is taken, as elsewhere in the present paper, from the base of the basal plica to the apex of the ovipositor; his, doubtless from the juncture of subgenital plate and ovipositor to apex of the latter, thus adding on an average about .4 mm. to the ovipositor length when compared with our method of measuring the same.

and adjacent portions of wings when at rest very dark and suggesting a suffused continuation of the medio-dorsal stripe, hyaline portion of wings iridescent and wing veins burnt lake (in this respect suggesting the otherwise distinctive *C. iriodes*). Genicular areas of caudal femora apically darkened. A darker phase of the species also occurs in which the green color is supplanted by yellowish brown. The female resembles the male in coloration excepting that the abdominal colors are much paler and more indistinct.

The localities given below and those of the type series define the known distribution of the species.

In addition to a paratypic pair from Gualaquiza, Ecuador, we have had before us the following series of 38 specimens; 15 males and 23 females.

Rio Mato, Venezuela, X to XI, 1909, (M. A. Carriker Jr.), 3 ♂, 1 ♀, [A. S. N. P.], (1 ♂ semi-macr.).

Bartica, British Guiana, XI, 30, 1912 to III, 6, 1913, (H. S. Parish), 10 ♂, 16 ♀, [A. N. S. P.], (2 ♂ semi-macr.).

Rockstone, British Guiana, VII, 9, 1911, (Crampton and Lutz), 1 ♀, [A. M. N. H.].

Paramaribo, Dutch Guiana, (K. Mayo), 1 ♂, 2 ♀, [A. N. S. P.], (1 ♂, 1 ♀ semi-macr.).

Perené, Peru, 1 ♀, [A. N. S. P.].

Contamano, Rio Ucayali, Peru, X to XII, 1912, 1 ♂, 2 ♀, [A. N. S. P.], (dr. alch.).

Conocephalus saltator (Saussure) (Pl. XXII, fig. 16; XXIII, 18, 19, 20, 21, 22 and 23.)

1859. *Xiphidium* *saltator* Saussure, Rév. et Mag. de Zool., 2e ser. xi, p. 208. [Guiana.] [Macropterous ♀.]

1875. *Xiphidium meridionale* Scudder, Proc. Bost. Soc. Nat. Hist., xvii, p. 460. [Brazil.] [Brachypterous ♀.]

1901. *Xiphidium propinquum* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 522. [Guatemala; Merida, Venezuela; St. Vincent, Lesser Antilles.] [Brachypterous series.]

1901. *Xiphidium brachypterum* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 523. [Venezuela; Colombia; Brazil; Peru.] [Brachypterous series.]

The description of *saltator* is very brief, but, although we have been unable to examine the type, we are convinced that it constitutes the basis of the present species. The present insect is the dominant species in the Guianas, the only other form found there to which could apply Saussure's very brief description being macropterous *C. cinereus*, which species we have from Cayenne,

French Guiana, labelled *fasciatus* by Saussure. Scudder's type of *meridionalis*, now before us, is a female showing the extreme of the brachypterous condition and having a decidedly longer and weakly (though more noticeably) curved ovipositor than normal; this specimen he quite naturally believed to be an undescribed species. It remained for Redtenbacher, however, to throw the nomenclature surrounding this, the dominant and most plastic species in tropical America, into hopeless confusion. In 1891 that author, in his "Monographie der Conocephaliden," sorted out all macropterous examples of the present species, recording them as *X. fasciatum* and probably as *X. saltator* in company with other macropterous examples of *fasciatus*, *cinereus* and probably other species; he then, having divided the brachypterous material into two series, erected the synonyms *propinquum* and *brachypterum*, suggesting the affinity of *nemorale* (for which he erected the synonym *X. curtipenne* on the previous page) and *gossypii* (Scudder's synonym of *C. brevipennis*) to *propinquum*, and Scudder's *meridionale* to *brachypterum*—the value of the resultant key may be imagined. Without long study of the series which Redtenbacher had before him it will be impossible to say to what species each individual record belongs, but the data given above will need but little modification. Karny, in his "Revisio Conocephalidarum," has made few changes from Redtenbacher's work which paper has succeeded only in bringing confusion to the study of this and doubtless the other American groups of the subfamily. The species is to be found in the literature frequently quoted as the above synonyms and also as *fasciatus*.⁷²

This insect, whose position in the genus is between *C. equatorialis* and *C. borelli* in group G of the subgenus *Xiphidion*, is the most abundant and widely distributed of the tropical American species. As is often the case with such species very great variation is found, and in the present case material from various portions or often from the same portion of its range exhibits diversity in width of vertex, form of lateral lobes of the pronotum, length and form of tegmina, production of male cerci (which, however, never differentiate from the typical general contour, thus fixing

⁷² Recorded by Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, ix, no. 184, p. 40, (1894), as *X. fasciatum* from San Pedro Province, Paraguay, and as *X. brachypterum* from Asuncion and San Pedro Province, Paraguay, (macropterous and brachypterous examples probably).

with certainty males of the species), length and degree of weak curvature or straightness of the ovipositor, coloration of the genicular areas of the caudal femora and armament of the ventro-external margins of the same. Even in the armament of the ventro-cephalic margins of the cephalic and median tibiae, three specimens from Dominica and Trinidad have seven instead of the normal six spines, a condition elsewhere found in the American species only in *C. angustifrons*, in which form it apparently always occurs. It would seem that several species or at least geographic races must exist, but this is certainly not the case. Certain variations, it is true, are found to be the usual condition over certain regions, but these are not fixed, and the same variation can almost invariably be found in other more typical series; often two series of the most distinctive appearing variations are from the same locality and we are inclined to believe that immediate environment has as much or more to do with the majority of such differences as geographic influences.

The species has been compared with its nearest ally, *C. equatorialis*, under that species.

As the species is nowhere fully described we here give the characters for a typical male and female as a basis for further discussion of the characters and variations of the species.

Bartica, British Guiana, I, 10, 1913, (H. S. Parish), [A. N. S. P.]. Size medium, form moderately slender. Vertex not strongly but distinctly ascending. Fastigium of vertex moderately broad, greatest width two-thirds that of proximal antennal joint, when seen from front about twice as deep as broad, narrowing with a weak concavity to facial suture. Eyes moderately large and but slightly protruding. Lateral lobes of pronotum with cephalic margin broadly arcuate to the ventro-caudal angle with the ventro-cephalic angle very weakly indicated, ventro-caudal angle sharply rounded (distinctly less than a right angle), caudal margin almost straight (nearly imperceptibly subsinuate), humeral sinus subobsolete, convex callosity very narrow (often subobsolete). Tegmina elongate, moderately broad, narrowing evenly to the rather sharply rounded apex; male tegminal tympanum not large, weakly longitudinal, stridulating vein not unusually elongate. Male cerci decidedly elongate, proximal portion stout, widening strongly and briefly swollen so as to overhang a small ventro-internal tooth, which is situated at the proximal base of the mesal portion and directed meso-proximad with the sharp apex strongly decurved, from near the base of this tooth to the apex of the cercus the entire cercus (excepting the proximo-external portion) is very greatly depressed, slanting strongly toward the internal margin, this elongate portion is not in a line with the base of the cercus but is directed moderately outward so that the

external margin of the cercus is broadly concave, the distal produced portion has the margins subparallel with the apex rather broadly rounded. Subgenital plate with distal margin weakly convex between the rather short disto-lateral styles (which are very slightly shorter than in *equatorialis*). Caudal femora not elongate for the genus, proximal portion decidedly swollen, ventro-external margins bearing a few small spines. Ovipositor moderately long, very slender and very weakly curved (almost straight).

Two brachypterous examples from the same locality agree in every respect excepting in the humeral sinus, which is wholly obsolete,⁷³ and in tegminal and wing length.

Series from Venezuela and Panama agree almost perfectly with those from Guiana. The brachypterous specimens demonstrate that the degree of sharpness of the rounded apex of the tegmina varies somewhat, as does also the degree of reduction of the tegmina.⁷⁴

Large series from Trinidad show numerous specimens with the vertex very slightly narrower than normal, while the majority of the large macropterous males and two large brachypterous males have the cerci abnormally elongate, the flattened distal portion being greatly produced and curved outward with the immediate apex sharply rounded. This condition is due to elongation and is decidedly variable in degree; the extremes would suggest distinct specific status, but in general contour no differences exist and all intermediate conditions are present.

The smallest brachypterous individuals from Trinidad agree well with a depauperate condition found predominant in the Lesser Antilles. These specimens are distinctly smaller than typical brachypterous material, the male cerci are slightly more attenuate while the ovipositor is shorter, some individuals showing as well the extreme condition of tegminal abbreviation for the species.

A series of large macropterous and brachypterous specimens from Philadelphia, Costa Rica, have the cerci decidedly produced

⁷³ Macropterism is often, if not always, accompanied by an appreciable production of the caudal margin of the dorsum of the pronotum and a resultant increase in the depth of the humeral sinus.

⁷⁴ This variation, the weakly or not suffused genicular areas of the caudal femora and the very weakly arcuate or almost straight ovipositor, appears to constitute the means by which Redtenbacher separated his series into what he called *brachypterum* and *propinquum*. Careful consideration would have shown these characters to be mere variations and each found to various degrees in various specimens.

but not to the degree of the maximum from Trinidad. Other specimens from Guatel, Costa Rica, are normal in this and other characters.

Southward from Guiana through Brazil the insect appears to become slightly more robust. In a series from Contanamo, Peru, this is appreciable, while in these the brachypterous specimens have the humeral sinus very weakly indicated and the macropterous specimens have it slightly more decided. The male cerci of these specimens are also slightly more robust.

A series from Santa Ana, Peru, taken at an elevation of three thousand feet, are all very depauperate, averaging the smallest of any series before us, but otherwise normal.

The considerable series from Rio de Janeiro, Brazil and Sapucay, Paraguay, shows the features found in the series from Contanamo, Peru, still more pronounced, though with some individual variation, in the Sapucay females the ovipositor shows the greatest length found in the species excepting in the females from the Alto Paraná (Puerto Cantera), Paraguay.

The only geographic differences appear to be the slight increase in general robustness in the southward distribution in South America and various ranges in ovipositor length, which, when we consider the plasticity of the species, certainly do not warrant the erection of a geographic race.

Measurements (in millimeters) of extremes

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
Long Ditton, Dominica ...	11.7-14	2.9-3.3	5.8-6.3	11-11.7	2-2.2
Philadelphia, Costa Rica...	13.5	3.2	18.9	13.6	2.3
Philadelphia, Costa Rica...	13.2-14.8	3.3-3.6	6.6-7.6	13.4-14.2	2.3-2.4
Rio Mato, Ven- ezuela	15.5-16.5	3.2-3.3	16.9-19.7	12.9	2.3-2.4
La Piedrita, Ven- ezuela	12.5	3.4	6.3	13.7	2.3
Caparo, Trinidad	14.3-16.4	3-3.4	15-18.9	12-14.3	2.1-2.6

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
Caparo, Trinidad	14.2-15.2	3.1-3.3	6.4-6.5	11.7-13.8	2-2.6
Bartica, British Guiana.....	13.3-15.3	3.2-3.7	17.3-18.8	12.6-14	2-2.2
Bartica, British Guiana.....	14	3.7	7.4	13.3	2.2
Pará, Brazil	13.3	3.1	17.3	12.7	2
Tijuca, Brazil ..	11.5-13.4	2.7-3.3	7.1-7.2	11-13.3	1.8-2.2
Chanchamayo, Peru	15.4	3.4	20.4	13.9	2.3
Contamano, Peru	13.4-13.6	3-3.3	17.4-18.9	12.8-13.4	2-2.1
Contamano, Peru	11.8-13.4	3.1-3.6	7.3-7.9	12.7-12.8	1.9-2.2
Santa Ana, Peru, 3000 ft.	10.8-12.7	3-3.4	6.3-8.6	10.3-12	1.9-2
Sapucay, Paraguay	15-16.5	3.6-3.7	20	13.4-14.4	2.1-2.2
Sapucay, Paraguay	12.9-15.4	3.3-3.6	7.3-8.8	12.1-13.7	2.1-2.3
Extreme range of variation	10.8-16.5	2.9-3.7	5.8-8.8 15-20.4	10.3-14.4	2-2.6
♀	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
Laudet, Dominica	12.8	3.2	3.3	.....	8.4
Long Ditton, Dominica	12.2-14.3	3.7-3.8	3.3-4.2	12.9	9-9.9
Philadelphia, Costa Rica ...	14.5-16	3.6-3.7	19.2-20.1	14.8-15.2	12.9-13
Philadelphia, Costa Rica ...	14.5	3.8	6.1	15.8	12.8
Rio Mato, Ven- ezuela	14-16.5	3.3-3.7	17.3-19.2	13.8-15	10.6-11.8
La Piedrita, Ven- ezuela	12.5-13.8	3.4-3.6	4-5.2	13.1-15	10.4-11
Caparo, Trinidad	15.5-18	3.6-3.7	16.7-19	14.9-15.9	9.9-12.1
Caparo, Trinidad	15.5-16	3.7-3.8	5.1-5.2	14.2-15.3	11-11.1
Trinidad	12.7	3.4	3.7	12.8	9.7
Bartica, British Guiana ⁷⁵	14.6-15.3	3.4-3.6	17.7-19.4	13.8-14	9.7-10.6

⁷⁵ This series is topotypic and, agreeing in every respect with the brief original description, may be considered typical.

♀	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
St. Jean, French Guiana.	14	3.3	18.2	14.3	12.7
Brazil. (<i>Type of meridionale.</i>) . .	13.2	3.7	5.1	13.1	12.7 ⁷⁶
Tijuca, Brazil . .	13.3-15	3.6-3.8	4.4-5.6	13.4-15	11.7-13.4
Perené, Peru. . . .	14	3.3	20.8	13.4	11.7
Contamano, Peru	14.8	3.5	19	13.6	11.6
Contamáno, Peru	13-14.7	3.6-3.8	4.9-5.2	13.7-14.3	10.3-11.7
Santa Ana, Peru, 3000 ft.	12.3	3.3	5.6	12	10.6
Alto Paraná, Par- aguay.	14.1	3.7	21	14.6	14.1
Puerto Cantera, Paraguay.	17.4-19.2	3.4-4	20.2-21.7	14.1-14.6	12.7-14.9
Puerto Cantera, Paraguay.	15.2	3.8	7.1	14.6	13.4
Sapucay, Paraguay	15.7-16.4	3.4-3.8	18.8-21.3	13.4-14.2	13.3-13.8
Sapucay, Paraguay	14-16.6	3.3-3.8	4.8-5.7	13-13.8	12-13.3
Extreme range of variation.	12.2-19.2	3.2-4	3.3-6.1 16.7-21.7	12-15.9	8.4-14.9

In this species the head and pronotum (excepting for a well defined, but not very dark, brown medio-longitudinal stripe), limbs (excepting that the genicular areas of the caudal femora are often somewhat, but not heavily, suffused with brown), thorax and proximal exposed portion of abdomen, green; dorsum, and in males all of distal portion of abdomen including cerci (which are in some series uniform in color, but in others much suffused with green) tawny with paler lateral stripes weakly indicated in concealed proximal portion. Females have the dorsum of the abdomen usually uniform tawny or brownish, but in some examples the paler lateral stripes appear and are occasionally continued to the base of the ovipositor.

The ventro-cephalic margins of the cephalic femora are armed with 6 and 7 spines in three specimens before us, and with 7 and 7 in one. Three of these are from Long Ditton, Dominica, the

⁷⁶ Scudder gives the ovipositor length as 13 mm. Our measurement of this dimension are all taken from the base of the basal plica to the apex of the ovipositor, hence the slight difference.

other from Port of Spain, Trinidad, which specimen has the ventro-cephalic margins of the median femora armed with 7 and 7 spines. In these specimens the extra (proximal) seventh spine is decidedly smaller than any of the others and abnormal in appearance; in *C. angustifrons* this spine is much more like the other six.

The ventro-external margins of the caudal femora are armed in the one hundred and ninety-four perfect specimens before us as follows:

Number of spines,	0-0	0-1	0-2	0-3	0-4	1-1	1-2
Number of specimens,	5	11	9	1	1	15	20
Number of spines,	1-3	1-4	1-5	2-2	2-3	2-4	2-5
Number of specimens,	10	6	1	19	23	12	1
Number of spines,	3-3	3-4	3-5	3-6	4-4	4-5	5-5
Number of specimens,	13	26	5	1	7	6	2

Of the five specimens with these margins unarmed, four are from Trinidad and one from Venezuela. The Paraguayan series average nearer the maximum number than do the others and one specimen bears a single spine on one of the ventro-internal margins as well; otherwise every series exhibits about the same amount of variability.

The genicular lobes of the caudal femora are normally bispinose, in the series before us one of these lobes is unispinose in thirteen specimens, two are so in one specimen, while all are in this condition in one.

Specimens Examined: 276; 114 males, 151 females, 4 immature males and 7 immature females.

Montserrat, West Indies, III, 1, 1894, (H. G. Hubbard), 1 ♂, [U. S. N. M.], (brach.).

Pointe à Pitre, Guadeloupe, West Indies, VI, 6, 1911, (Crampton and Lutz), 2 ♂, 1 ♀, [A. M. N. H.], (brach.).

Roseau, Dominica, West Indies, VI, 8, 1911, (Crampton and Lutz), 1 ♂, [A. M. N. H.], (brach.).

Laudet, Dominica, West Indies, VI, 12, 1911, (Crampton and Lutz), 1 ♂, 1 ♀, [A. M. N. H.], (brach.).

Long Ditton, Dominica, West Indies, VI, 20, 1911, (Crampton and Lutz), 7 ♂, 4 ♀, [A. M. N. H.], (brach.).

Martinique, West Indies, VII, 26, 1905, (A. Busck), 1 ♀, [U. S. N. M.], (brach.).

Saint Lucia, West Indies, XI, 25, 1912, (H. S. Parish), 1 ♀, [A. N. S. P.], (Macr.).

San Mateo, Costa Rica, I, 1903, 250 meters elevation, (P. Biolley), 1 ♀, [Hebard Cln.], (macr.).

Rio Grande, Costa Rica, III, 6, 1912, (M. Cary), 1 ♀, [Hebard Cln.], (brach.).

Pózo Azúl, Costa Rica, 1 ♀, [Hebard Cln.], (macr.)

Juan Viñas, Costa Rica, XI, 1906, (Wm. Schaus), 1 ♀, [U. S. N. M.], (brach.).

Siquirres, Costa Rica, VII, 3, 1903, (M. A. Carriker Jr.), 2 ♀, [Hebard Cln.], (1 brach.).

Guátel, Costa Rica, IV, 20 to 22, 1902, (C. F. Underwood), 1 ♂, 2 ♀, [Hebard Cln.], (brach.).

Philadelphia Banana Ranch, Costa Rica, (F. Knab), 5 ♂, 4 ♀, [U. S. N. M.], (3 ♂, 1 ♀ brach.).

Ancon, Canal Zone, Panama, XI, 12 and 16, 1913, (Hebard; lush grasses on hillside), 3 ♂, 3 ♀, [Hebard Cln.], (brach.).

Old Panama, Panama, XI, 13, 1913, (Hebard; grasses near jungle), 3 ♂, 3 ♀, [Hebard Cln.], (brach.).

Zone limit three miles west of Empire, Panama, XI, 14, 1913, (Hebard; grasses near jungle), 2 ♂, [Hebard Cln.], (brach.).

Culebra, Canal Zone, Panama, (H. H. Rousseau), 1 ♀, [U. S. N. M.], (macr.; dr. alch.).

Buenaventura, Colombia, V, 7 and 8, 1914, (H. S. Parish), 2 ♀, [A. N. S. P.], (brach.).

Cali, Colombia, V, 26, 1914, (H. S. Parish), 1 ♀, [A. N. S. P.], (brach.).

San Esteban, Venezuela, X to XI, 1910, (M. A. Carriker Jr.), 2 ♂, 2 ♀, 1 juv. ♂, [A. N. S. P.].

La Guira, Venezuela, (Robinson), 1 ♀, [M. C. Z.], (macr.).

Rio Mato, Venezuela, X and XI, 1909, (M. A. Carriker Jr.), 3 ♂, 6 ♀, [A. N. S. P.], (macr.).

Las Quiguas, Venezuela, IX, 1910, (M. A. Carriker Jr.), 2 ♂, 2 ♀, 2 juv. ♀, [A. N. S. P.], (adults brach.).

Cariaquito, Venezuela, I, 18 to 22, 1911, (S. Brown), 1 ♂, 4 ♀, 1 juv. ♂, [A. N. S. P.], (adults brach.).

La Piedrita, Venezuela, II, 16, 1911, (S. Brown), 2 ♂, 5 ♀, [A. N. S. P.], (brach.).

Buelta Triste, Venezuela, II, 20, 1911, (S. Brown), 1 ♀, [A. N. S. P.], (brach.).

Port of Spain, Trinidad, VI, 19 to 20, 1905, (A. Busek), 5 ♂, 2 ♀, [U. S. N. M.], (2 ♂ macr.).

Caparo, Trinidad, VIII, 1913, (S. M. Klages), 15 ♂, 28 ♀, [Hebard Cln.], (2 ♂, 5 ♀ brach.).

Heights of Aripo, Trinidad, VIII, 20 to IX, 21, 1909, (M. A. Carriker Jr.), 4 ♂, 7 ♀, 2 juv. ♂, 1 juv. ♀, [A. N. S. P.], (1 ♂, 2 ♀ macr.).

Carenage, Trinidad, VIII, 1909, (M. A. Carriker Jr.), 2 ♂, 1 ♀, [A. N. S. P.], (♀ macr.).

Bartica, British Guiana, XII, 3, 1912, to III, 28, 1913, (H. S. Parish), 11 ♂, 21 ♀ [A. N. S. P.], (1 ♂, brach.); V, 8, 1901, (R. J. Crew, 1 ♀, [A. N. S. P.], (macr.).

Georgetown, British Guiana, VII, 2, 1911, (Crampton and Lutz), 1 ♂, [A. M. N. H.], (macr.).

Rockstone, British Guiana, VII, 8 and 9, 1911, (Crampton and Lutz), 1 ♂, 1 ♀, [A. M. N. H.], (♀ macr.).

Tumatumari, British Guiana, VII, 11, 1911, (Crampton and Lutz), 2 ♂, [A. M. N. H.], (1 macr.).

Paramaribo, Dutch Guiana, (K. Mayo), 4 ♂, 5 ♀, [A. N. S. P.], (2 ♂, 4 ♀ macr.).

St. Jean, Maroni River, French Guiana, VI, (Wm. Schaus), 1 ♀, [U. S. N. M.], (macr.).

Pará, Brazil, (C. F. Baker), 1 ♂, [A. N. S. P.], (macr.).

Igarape-Assu, Pará, Brazil, I, 17, 1912, (H. S. Parish), 1 ♂, [A. S. N. P.], (macr.).

Tijuca, Rio de Janeiro, Brazil, IV, 9 to 11, 1913, (M. Burr), 8 ♂, 5 ♀, 1 juv. ♀, [A. N. S. P. and Oxford Univ. Mus.].

Perené, Peru, III, 1900, 1 ♀, [A. N. S. P.], (macr.).

Chanchamayo, Peru, 1 ♂, [A. N. S. P.], (macr.).

Santa Ana, Eastern Peru, 3000 ft., (Yale Peruvian Exp. 1911), 5 ♂, 1 ♀, 1 juv. ♀, [U. S. N. M.], (adults brach., dr. alch.).

Contamano, Rio Ucayali, Peru, X to XII, 1912, 10 ♂, 3 ♀, 1 juv. ♀, [A. N. S. P.], (3 ♂, 1 ♀ macr., dr. alch.).

Alto Paraná, Paraguay, III, 1914, 1 ♀, [A. N. S. P.], (macr.).

Puerto Cantera, Alto Paraná, Paraguay, XII, 9, 1913, (C. Schrottky), 3 ♀, [A. N. S. P.], (2 macr.).⁷⁷

Sapucay, Paraguay, I, 5-III, 21, 1900 to 1905, (W. T. Foster), 7 ♂, 19 ♀, 1 juv. ♀, [U. S. N. M. and Hebard Cln.], (3 ♂, 9 ♀ macr.).

Conocephalus borelli (Giglio-Tos) (Pl. XXII, figs. 21 and 24.)

1897. *X[iphidium] borellii* Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, xii, no. 302, p. 41. [San Lorenzo and Caiza, Bolivia.]

The present insect is represented in the material before us by but two females, which agree with the original description but are slightly larger than the maximum measurements.

These specimens show, as Giglio-Tos states, that the species is very near *C. saltator* (that author, however, using the synonymous name *X. brachypterum*). When compared with brachypterous but otherwise typical females of *saltator*, we find our specimens, as Giglio-Tos has observed, to be differentiated by the decidedly

⁷⁷ This series has been recorded in part by Caudell, the macropterous individuals correctly, the brachypterous examples as the synonymous *meridionale*, Proc. U. S. Nat. Mus., xxx, p. 242, (1906), and macropterous specimens correctly by Rehn, Proc. Acad. Nat. Sci. Phila., 1907, p. 393, (1907). In following Redtenbacher's Monograph, subsequent authors have almost without exception been led into the error of considering the macropterous and brachypterous conditions of the present insect separate specific units.

broader tegmina with apices truncate and very broadly rounded (very much more so than in any examples of *saltator*), with veins decidedly less distinct and by the much more decidedly curved ovipositor. The males are said to have the distinguishing characters of the tegmina equally pronounced. We find the wings of the females to be distinctly aborted, but not reduced to a filiform condition. We do not consider the incision of the female subgenital plate given by Giglio-Tos to be of any value.

In addition to the characters given above, we would say that in the specimens before us the form is distinctly heavier than even the extreme of this tendency found in *saltator* in Paraguay. The eyes are distinctly larger and more protruding, while the vertex is narrower than is normal in *saltator*, being slightly less than two-thirds the width of the proximal antennal joint, and decidedly deeper, being two and three-fourths times as deep as greatest width, with sides distinctly but weakly convergent, almost straight. The lateral lobes of the pronotum have the cephalic margin broadly rounded to the ventro-caudal angle with the ventro-cephalic angle weakly indicated, the ventro-caudal angle is sharply rounded, the caudal margin straight with the humeral sinus absent, the convex callosity is very narrow. The latero-dorsal pale bands of the abdomen are slightly more distinct than in any specimens of *saltator* before us, while the genicular areas are contrastingly darkened. The ovipositor is not only more decidedly curved than in that species but differs also in shape, narrowing appreciably from the median point to the acute apex, which narrowing begins in *saltator* near the apex as is normal for the great majority of the American species. The specimens before us have the ventro-external margins of the caudal femora armed with 4 and 5 and 5 and 5 spines, which are heavier than normal in the allied species. Their measurements are: length of body 15.5-16.3, pronotum 3.7-4, tegmen 3-3.9, caudal femur 15.4-16, ovipositor 9.7-10.1 and width of tegmen 2.6-2.7 mm.

Specimens Examined: 2; 2 females.

Sapucay, Paraguay, I, 24, to 25 and II, 1901, (W. T. Foster), 2 ♀ [U. S. N. M. and Hebard Cln.], (brach.).

Conocephalus truncatus (Redtenbacher) (Pl. XXII, figs. 7, 17 and 22; XXIII, 24 and 25; XXIV, 7).

1901. *Xiphidium truncatum* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 522. [Brazil.]

In general form, tegminal structure, vertex and male cerci the present insect shows its close affinity to *C. versicolor* and *C. ochrotelus*. In the last two characters it more closely agrees with the former species; the cerci are, however, less elongate with swollen portion overhanging the tooth more decided and distal portion narrowing to a sharper apex. In the tegminal structure close affinity is shown to *ochrotelus*. In coloration and unarmed ventral margins of the caudal femora, it agrees with neither of the above species.

Size medium, form moderately robust. Vertex not strongly but distinctly ascending, narrow, greatest width one-half that of proximal antennal joint, about two and three-fourths times as deep as wide, sides straight and very weakly convergent. Eyes moderately large and decidedly protruding. Antennae greenish with each joint weakly annulate with brown at the suture, not of the extreme length found in *versicolor*. Lateral lobes of pronotum with cephalic margin convex to the sharply rounded ventro-caudal angle, ventro-cephalic angle weakly defined, caudal margin subsinuous, almost straight, humeral sinus absent, convex callosity very narrow. Tegmina of male similar to those of *ochrotelus* but with veinlets distinct and large tympanum considerably more elongate, distinctly longitudinal; wings small and aborted, about half as long as tegmina. Tegmina of female small rounded pads, usually overlapping dorsad; wings small aborted pads of nearly equal length. Male cerci with basal third moderately stout, mesal third distinctly swollen and decidedly produced above a rather long and slender ventral tooth, which is straight to the sharp and decurved apex, the tooth situated proximad of the middle and directed meso-proximad, distal portion of cercus directed weakly outward, distinctly and evenly flattened, with margins converging evenly to the acute apex. Subgenital plate of male truncate between the rather short distolateral styles. Ovipositor short and weakly but distinctly arcuate dorsad. Subgenital plate of female flat with lateral margins strongly and rather broadly curved upward, embracing the base of the ovipositor. Caudal femora with proximal portion

decidedly swollen, genicular lobes bispinose, ventral margins unarmed.

Coloration.—Male: Head excepting eyes and dorsal surface, lateral lobes of pronotum, body and exposed proximal portion of abdomen, cephalic and median limbs and greater part of swollen portion of caudal femora light oriental green, caudal margin of pronotum, tegmina, abdomen and cerci uniform cinnamon. Remaining portions of caudal limbs greenish washed with cinnamon, excepting the genicular lobes which are briefly suffused with chestnut. Medio-dorsal stripe of head and pronotum very broad, shining blackish brown, with pale margins buffy and wider than is usual. Eyes chestnut brown. In the female the coloration is similar, excepting that the abdomen shows traces of darker longitudinal stripes on the dorsum and sides, in one specimen before us these stripes being pronounced, those on the sides darkest, chestnut brown. The coloration of part of the series is apparently well preserved.

Measurements (in millimeters) of extremes

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
Petropolis, Brazil.					
♂	10.5-13	3.1-3.3	5.2-5.8	10.8-12	.....
♀	12-14	3.2-3.3	2.6-2.6	11.7-12.3	8-8.9

Specimens Examined: 17; 6 males and 11 females.

Petropolis, Rio de Janeiro, Brazil, IV, 12 to 14, 1913, (M. Burr), 6 ♂, 10 ♀, [A. N. S. P. and Oxford Univ. Cln.].

Tijuca, Rio de Janeiro, Brazil, IV, 9 to 11, 1913, (M. Burr), 1 ♀, [A. N. S. P.].

Conocephalus versicolor (Redtenbacher) (Pl. XXII, figs. 8 and 18; XXIII, 26 and 27; XXIV, 8.)

1891. *Xiphidium versicolor* Redtenbacher, Verh. k.-k. zool.-bot. Gesell, Wien, xli, p. 507. [Fonteboa, Brazil.] [Macropterous ♂].

1898. *X[iphidium] festae* Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, xiii, no. 311, p. 92. [San José, Gualaquiza and Valleys of Santiago and Zamora, Ecuador.] [Brachypterous series.].

With the present knowledge of the genus it is perfectly evident that *festae* is an absolute synonym of the present species, based on brachypterous material; from three of the four localities given

for *festae*, Giglio-Tos records *versicolor* as well and suggests the possibility of *festae* being but a variety of that species.

The present species is a member of the distinctive South American group H of the subgenus *Xiphidion*, remarkable for the brilliant and very distinctive coloration of the species.

The male sex of the species is very striking, the green cephalic and median limbs, wings and cerci contrasting brilliantly with the yellow head, lateral lobes of the pronotum, caudal femora (excepting the dark genicular areas) and abdomen, which latter furthermore has the dorsal abdominal segments strikingly marked as follows: the proximal five are shining black dorsad and laterad, the sixth and seventh maculate with black meso-dorsad, while the greater part of the eighth and all of the ninth and tenth are shining black. The female has the abdomen similarly but much less strongly darkened.

Size rather large, form graceful with limbs decidedly elongate. Vertex not strongly but distinctly ascending, narrow, greatest width one-half that of proximal antennal joint, slightly over two and three-fourths times as deep as wide, sides straight and very weakly convergent. Eyes moderately large and decidedly protruding. Antennae greenish with each joint annulate at the suture with brown, in material before us 62 mm. in length. Lateral lobes with cephalic margin convex to the sharply rounded ventro-caudal angle, ventro-cephalic angle broadly rounded but evident, caudal margin subsinuous, almost straight, humeral sinus absent, convex callosity very narrow. Tegmina, in macrop-terous and brachypterous material, with apex sharply rounded; male tympanum very small and distinctly though not strongly longitudinal. Male cerci moderately elongate (2 to 2.2 mm. in material before us), very slightly but noticeably irregular in outline, basal third moderately stout, mesal third distinctly and evenly swollen, this swelling more decided, however, above a rather long and rather slender ventral tooth which is straight to the sharp decurved apex, the tooth situated proximad of the middle and directed strongly meso-proximad, distal portion curved weakly outward, distinctly but regularly flattened, particularly on the inner side, with margins very weakly irregular but converging evenly to the rather sharply rounded apex. The cercus has the same appearance found in the North American *C. nigro-pleuroides*, suggesting minor irregularities more strongly than do

the normal hard and rigid appearing cerci of the other species of the genus. Subgenital plate truncate between the short distolateral styles. Ovipositor elongate (in the specimen before us 13 mm.), nearly straight. The caudal femora are elongate (σ , 13.7–15.7; φ , 16.2 in the material before us) and armed with (σ , 3 and 4 and 4 and 5; φ , 4 and 5, in our material) long, heavy spines.

Specimens Examined: 3; 2 males and 1 female.

Caparo, Trinidad, VIII, 1913, (S. M. Klages), 2 σ , [Hebard Cln.], (brach.).

Contamano, Rio Ucayali, Peru, X to XII, 1912, 1 φ , [A. N. S. P.], (macr., dr. alch.).

Conocephalus ochrotelus⁷⁸ new species (Pl. XXI, fig. 7; XXII, 9; XXIII, 28 and 29; XXIV, 9.)

Apparently nearest in relationship to *C. truncatus*⁷⁹ and allied to *C. versicolor*, but distinctive in coloration and several other important characters given below.

Type: σ , Itatiba, São Paulo, Brazil. April 10. (J. Lima.) [Academy of Natural Sciences Philadelphia, Type No. 5268.]

Description of Type.—Size medium, form moderately robust. Coloration very distinctive. Head with dorsum of vertex when seen from lateral aspect scarcely ascending (not as much as in *versicolor*), fastigium of vertex narrow, but about two-thirds as wide as basal antennal joint, two and one-fourth times as long as broad, sides straight and not decidedly convergent. Eyes moderately large, moderately protruding (not as much so as in *versicolor*). Lateral lobes of pronotum with cephalic margin convex to the ventro-caudal angle, ventro-cephalic angle very broadly rounded but distinct, ventro-caudal angle sharply rounded and rectangulate, humeral sinus absent, convex callosity very narrow. Tegmina broad and truncate with very broadly rounded apex, covering half the distance from the pronotum to the apices of the cerci, veins distinct, veinlets subobsolete, tympanum large and distinctly though not strongly longitudinal (somewhat more nearly transverse than in *versicolor*); wings small aborted pads broadly rounded at apex, extending half the distance from the tegminal speculum to the apices of the tegmina. Cerci heavy and elongate, proximal portion stout and very brief, mesal portion very elongate and much swollen, produced weakly interno-proximad in a rounded narrow shelf, in the mesal portion of which is situated ventrad a rather heavy tooth directed strongly meso-proximad with its sharp apex weakly decurved, distal portion of shaft broad and rather elongate, decidedly depressed, sides subparallel to apical portion, where they become evenly convexo-convergent to the very

⁷⁸ From $\omega\chi\rho\sigma$ =pale and $\tau\acute{\epsilon}\lambda\omicron\sigma$ =end, in allusion to the pale and strongly contrasting coloration of the two distal dorsal abdominal segments.

⁷⁹ See page 280 for comparison with this species.

sharply rounded apex, giving the contour of a very narrow Gothic arch. Subgenital plate short, truncate distad between the short disto-lateral styles. Cephalic and median limbs very slightly shorter and heavier than in *versicolor*, with ventral margins of tibiae each likewise armed with six heavy spines (slightly heavier than in *versicolor*). Caudal femora proportionately shorter than in *versicolor* with proximal decidedly swollen portion similar, ventro-external margins bearing 5 and 8 spines, genicular lobes of caudal femora heavily bispinose, genicular areas weakly darkened.

The measurements of the type are: length of body 13.5, pronotum 3.6, tegmina 4.9 and 5.2, caudal femur 13.4, cercus 2.3 and approximate width of tegmen if flattened out 3.3 mm.

The coloration is distinctive. Head, lateral lobes of pronotum, thorax, limbs, exposed lateral portions of dorsal abdominal segments and cerci pale bice green. Medio-dorsal stripe of head and pronotum warm sepia shading mesad on pronotum to verona brown, rather broadly margined laterad with cinnamon buff. Eyes and tegmina cinnamon, humeral trunk of tegmina cinnamon buff. Concealed proximal portion of dorsum of abdomen tawny olive paler mesad (cinnamon buff) and showing rather broad lines of the same color meso-laterad. Exposed portion of dorsum of abdomen with sixth segment weakly, and seventh and eighth heavily and broadly suffused with sepia, the margins of these segments marked with a greenish suffusion, ninth and tenth segments, subgenital plate and ventral abdominal segments pinkish cinnamon contrasting strongly with the proximal dorsal abdominal segments and cerci, tenth abdominal segment with distal margin strongly suffused with warm sepia. Genicular areas of caudal femora suffused (but not strikingly so) with bistre.

The present species is known from the unique type.

Subgenus **Perissacanthus**⁸⁰ new subgenus

The subgenus includes a single species from Paraguay.

Type of Subgenus.—*Conocephalus strictoides* [*Xiphidium strictoides*] (Caudell).

Subgeneric Description.—Prosternum bispinose. Male subgenital plate as in the subgenus *Xiphidion*. Ventral margins of cephalic and median tibiae armed with six well spaced spines. Interno-dorsal of distal spurs of caudal tibiae absent so that their

⁸⁰ From *περισσός*=odd (number) and *ἄκανθα*=thorn, in allusion to the five instead of six distal spurs of the caudal tibiae.

number is five, instead of six as found in the great majority of the species of the genus. Size medium for the genus, form very attenuate.

Conocephalus strictoides (Caudell) (Pl. XXI, figs. 2 and 5; XXII, 10 and 19; XXIII, 30 and 31.)

1906. *Xiphidium meridionale* Caudell (not of Scudder, 1875), Proc. U. S. Nat. Mus., xxx, p. 242. (In part.) [Sapucay, Paraguay.] [2 ♂.]

1906. *Xiphidium strictoides* Caudell, Proc. U. S. Nat. Mus. xxx, p. 242. [Sapucay, Paraguay.] [3 ♀, 1 juv. ♀.]

This distinctive species shows a slight amount of similarity to the North American *C. spartinae* in the general form of the male cercus; the ovipositor is decidedly longer than in any other American species excepting *C. strictus* and *C. leptopterus*, all of which species differing greatly in most important respects.

Caudell unfortunately included males before him with a series of brachypterous *C. saltator*, recording them as *meridionale*, a synonym of *saltator*. We consequently here select and describe the allotype.

Allotype: ♂; Sapucay, Paraguay. January 29, 1901. (W. T. Foster.) [United States National Museum.]

Description of Allotype.—Very similar to type excepting in sex characters. Size medium, form very slender. Head with vertex strongly produced, when seen from lateral aspect not ascending above plane of occiput; fastigium of vertex narrow, greatest width very slightly more than one-half that of proximal antennal joint, narrowing strongly to point two-thirds of the distance from apex to facial suture, thence subparallel to latter, two and one-half times as long as broad. Eyes rather small for the South American species of the genus (about as in *C. brevipennis* and *C. spartinae*) and also not strongly protruding. Lateral lobes of pronotum with cephalic margin very broadly and evenly convex and unusually oblique to the rather sharply rounded ventro-caudal angle which is rectangulate, caudal margin almost straight but with a subobsolete convexity at convex callosity, humeral sinus absent, convex callosity moderately broad. Tegmina rather narrow, reaching two-thirds of the distance to the apex of abdomen with apices truncate and broadly rounded, veins distinct but very delicate, veinlets exceedingly delicate, tympanum very small and distinctly longitudinal (slightly more so than in *C. versicolor*), with stridulating vein decidedly swollen for two-thirds of its length; wings about four-fifths as long as tegmina with broadly rounded apices showing a tendency toward an aborted condition. Cerci rather slender and elongate, brief proximal portion rather stout, very elongate mesal portion decidedly and evenly swollen except above the proximo-ventral rather slender tooth, which it overhangs in a squared projection with immediate angle rounded, the tooth

directed strongly meso-proximad with sharp apex weakly decurved, internal margin of swollen portion straight, external margin of cercus concave, distal portion strongly depressed and directed outward with margins converging to the rather broadly rounded apex. Subgenital plate with distal margin very weakly concave between the comparatively long disto-lateral styles. Ventral margins of the caudal femora unarmed, genicular areas not darkened, genicular lobes normally bispinose; tarsi, comparatively, rather short.

Females rather similar excepting for sex characters but slightly more slender, with caudal margins of lateral lobes of pronotum straight. Tegmina not as long as pronotum, much shorter than in male, rather broadly rounded at apex; wings reaching to tips of tegmina, rather broadly rounded at apices and distinctly aborted. Ovipositor very long and slender and very weakly curved, approximately straight. Subgenital plate shield-shaped, mainly flat, briefly curving upward laterad and embracing base of ovipositor, brief distal margin of flat surface transverse.

Measurements (in millimeters)

Sapucay, Paraguay.	Length of body	Length of pronotum	Length of tegmen	Width of tegmina	Length of caudal femur	Length of cercus	Length of style	Length of ovipositor
<i>Allotype</i> , ♂ . . .	16	3.2	7.9	2.8	12.6	2.2	.6	....
♂	16	3.1	7.6	2.8	12.9	2.2	.7	....
♀	15.5	3.3	3.2	...	13.3	...	..	21.1

The type series and males in the United States National Museum examined by us, and an additional female taken by the same collector at the same locality and in the Hebard Collection, these specimens taken from December to April 1900-1902, two males, four females and one immature female, are the only specimens known of this interesting species.

Subgenus **Aphauropus**⁸² new subgenus

The subgenus includes a single species from Tepic, Mexico.

Type of Subgenus.—*Conocephalus leptopterus* new species.

Subgeneric Description.—Prosternum bispinose. Subgenital plate of male unknown. Ventral margins of cephalic and median tibiae armed with seven or eight well spaced spines. Caudal tibiae with dorsal and ventral pairs of distal spurs absent, armed at the distal extremities with a single (well-developed) pair of median spurs as in the subgenus *Anarthropus*. Tegmina of female greatly aborted, wings missing. Size medium for the genus, form robust.

⁸¹ Approximately, if flattened out.

⁸² From ἀφαιρός=weak and πούς=foot, in allusion to absence of the normal dorsal and ventral pairs of distal spurs of the caudal tibiae.

Conocephalus leptopterus⁸³ new species (Pl. XXI, figs. 1 and 4; XXII, 11.)

This distinctive species would suggest *C. strictus* in the robust form, unarmed ventral margins of the caudal femora, unispinose genicular lobes and very long ovipositor, but when examined is found to be widely separated from any known form of the genus. The insect agrees with *C. saltans* in having the caudal tibiae armed distad with but a single pair of spurs, but in the present insect the prosternum is bispinose and the cephalic and median tibiae have their margins armed with seven or eight instead of six spines. In a number of characters the insect is unique.

Type: ♀; Tepic, Tepic, Mexico. [Hebard Collection, Type No. 385.]

Description of Type.—Size medium, form robust. Dark medio-dorsal band of head and pronotum continued solid and uninterrupted on abdomen to base of ovipositor. Head with vertex, when seen from lateral aspect, in same horizontal plane as occiput, fastigium of vertex narrow but about two-thirds as wide as proximal antennal joint, nearly two and one-half times as deep as broad, narrowing evenly three-fourths of the distance from apex to facial suture, then subparallel, this whole outline almost imperceptibly concave. Eyes medium for the genus (small for so robust an insect), not strongly protruding. Pronotum unusually long and of exceptional shape, lateral lobes broadly rounded to the ventro-caudal angle which is distinctly obtuse-angulate, caudal margin straight, very weakly subsinuate, humeral sinus absent, convex callosity exceedingly broad, swollen and conspicuous; the cephalic and caudal margins are strongly oblique to the ventro-caudal angle, which is almost mesal in position. Tegmina greatly aborted, small rounded pads wholly concealed by pronotum; wings absent. Ovipositor very long and slender showing a very weak upward curvature, approximately straight. Subgenital plate broadly shield-shaped, mainly flat, briefly curved upward laterad and embracing the base of the ovipositor, distal rather broad margin of flat surface transverse.

The measurements of the type are: length of body 13.5, pronotum 4.2, caudal femur 13.9, ovipositor 30.1 mm.

The type is unique, a dried alcoholic individual.

⁸³ From λεπτός=minute and πτερόν=wing, in allusion to the minute, aborted and wholly concealed tegmina found in the female sex of this extraordinary species.

EXPLANATION OF PLATES.

Plate XXI

- Fig. 1.—*Conocephalus leptopterus* new species. Tepic, Mexico. Female (*type*). Lateral outline. ($\times 3$)
- Fig. 2.—*Conocephalus strictoides* (Caudell). Sapucay, Paraguay. Male (*allotype*). Lateral outline of vertex. ($\times 25$)
- Fig. 3.—*Conocephalus unicolor* (Bruner). Corumbá, Brazil. Female (*topotype*). Lateral outline. ($\times 3$)
- Fig. 4.—*Conocephalus leptopterus* new species. Tepic, Mexico. Female (*type*). Distal extremity of caudal tibia, internal aspect. ($\times 20$)
- Fig. 5.—*Conocephalus strictoides* (Caudell). Sapucay, Paraguay. Male (*allotype*). Distal extremity of caudal tibia, internal aspect. ($\times 20$)
- Fig. 6.—*Conocephalus iriodes* new species. Kaiteur, British Guiana. Male (*type*). Lateral outline. ($\times 3$)
- Fig. 7.—*Conocephalus ochrotelus* new species. Itatiba, Brazil. Male (*type*). Lateral outline ($\times 3$)

Plate XXII

Outline of cephalic view of fastigium. ($\times 25$)

- Fig. 1.—*Conocephalus longipes* (Redtenbacher). Carcaraña, Argentina. Male.
- Fig. 2.—*Conocephalus vitticollis* (Blanchard). El Olivar, Colchagua, Chile. Male.
- Fig. 3.—*Conocephalus ictus* (Scudder). Otoyac, Mexico. Male.
- Fig. 4.—*Conocephalus insularis* (Morse). Pinar del Rio, Cuba. Male.
- Fig. 5.—*Conocephalus iriodes* new species. Kaiteur, British Guiana. Male (*type*).
- Fig. 6.—*Conocephalus angustifrons* (Redtenbacher). Juan Viñas, Costa Rica. Male.
- Fig. 7.—*Conocephalus truncatus* (Redtenbacher). Petropolis, Brazil. Male.
- Fig. 8.—*Conocephalus versicolor* (Redtenbacher). Caparo, Trinidad. Male.
- Fig. 9.—*Conocephalus ochrotelus* new species. Itatiba, Brazil. Male (*type*).
- Fig. 10.—*Conocephalus strictoides* (Caudell). Sapucay, Paraguay. Male (*allotype*).
- Fig. 11.—*Conocephalus leptopterus* new species. Tepic, Mexico. Female (*type*).
- Outline of lateral lobe of pronotum. ($\times 6$)
- Fig. 12.—*Conocephalus cinereus* (Thunberg). Kingston, Jamaica. Male (*topotype*).
- Fig. 13.—*Conocephalus ictus* (Scudder). Santa Rosa, Mexico. Atypical male.
- Fig. 14.—*Conocephalus insularis* (Morse). Pinar del Rio, Cuba. Male.
- Fig. 15.—*Conocephalus angustifrons* (Redtenbacher). Juan Viñas, Costa Rica. Male.
- Fig. 16.—*Conocephalus saltator* (Saussure). Paramaribo, Dutch Guiana. Male (*topotype*).

Fig. 17.—*Conocephalus truncatus* (Redtenbacher). Petropolis, Brazil. Male.

Fig. 18.—*Conocephalus versicolor* (Redtenbacher). Caparo, Trinidad. Male.

Fig. 19.—*Conocephalus strictoides* (Caudell). Sapucay, Paraguay. Male (allotype).

Fig. 20.—*Conocephalus ictus* (Scudder). Otoyac, Mexico. Male.

Outline of female tegmen. ($\times 3$)

Fig. 21.—*Conocephalus borelli* (Giglio-Tos). Sapucay, Paraguay.

Fig. 22.—*Conocephalus truncatus* (Redtenbacher). Petropolis, Brazil.

Outline of ovipositor. ($\times 2$)

Fig. 23.—*Conocephalus iriodes* new species. Kaiteur, British Guiana. (Allotype.)

Fig. 24.—*Conocephalus borelli* (Giglio-Tos). Sapucay, Paraguay.

Plate XXIII

Dorsal (first number) and lateral (second number) outlines of male cercus. ($\times 10$)

Figs. 1 and 2.—*Conocephalus longipes* (Redtenbacher). Carcaraña, Argentina.

Figs. 3 and 4.—*Conocephalus viticollis* (Blanchard). El Olivar, Colchagua, Chile.

Figs. 5 and 6.—*Conocephalus cinereus* (Thunberg). Kingston, Jamaica. (Topotype.)

Fig. 7.—*Conocephalus ictus* (Scudder). Santa Rosa, Mexico. Atypical.

Figs. 8 and 9.—*Conocephalus ictus* (Scudder). Otoyac, Mexico.

Figs. 10 and 11.—*Conocephalus insularis* (Morse). Pinar del Rio, Cuba.

Figs. 12 and 13.—*Conocephalus iriodes* new species. Kaiteur, British Guiana. (Type.)

Figs. 14 and 15.—*Conocephalus angustifrons* (Redtenbacher). Juan Viñas, Costa Rica.

Figs. 16 and 17.—*Conocephalus equatorialis* (Giglio-Tos). Bartica, British Guiana.

Figs. 18 and 19.—*Conocephalus saltator* (Saussure). Caparo, Trinidad. More elongate condition.

Figs. 20 and 21.—*Conocephalus saltator* (Saussure). Paramaribo, Dutch Guiana. (Topotype.) Normal condition.

Figs. 22 and 23.—*Conocephalus saltator* (Saussure). Tijuca, Brazil. More robust condition.

Figs. 24 and 25.—*Conocephalus truncatus* (Redtenbacher). Petropolis, Brazil.

Figs. 26 and 27.—*Conocephalus versicolor* (Redtenbacher). Caparo, Trinidad.

Figs. 28 and 29.—*Conocephalus ochrotelus* new species. Itatiba, Brazil. (Type.)

Figs. 30 and 31.—*Conocephalus strictoides* (Caudell). Sapucay, Paraguay. (Type.)

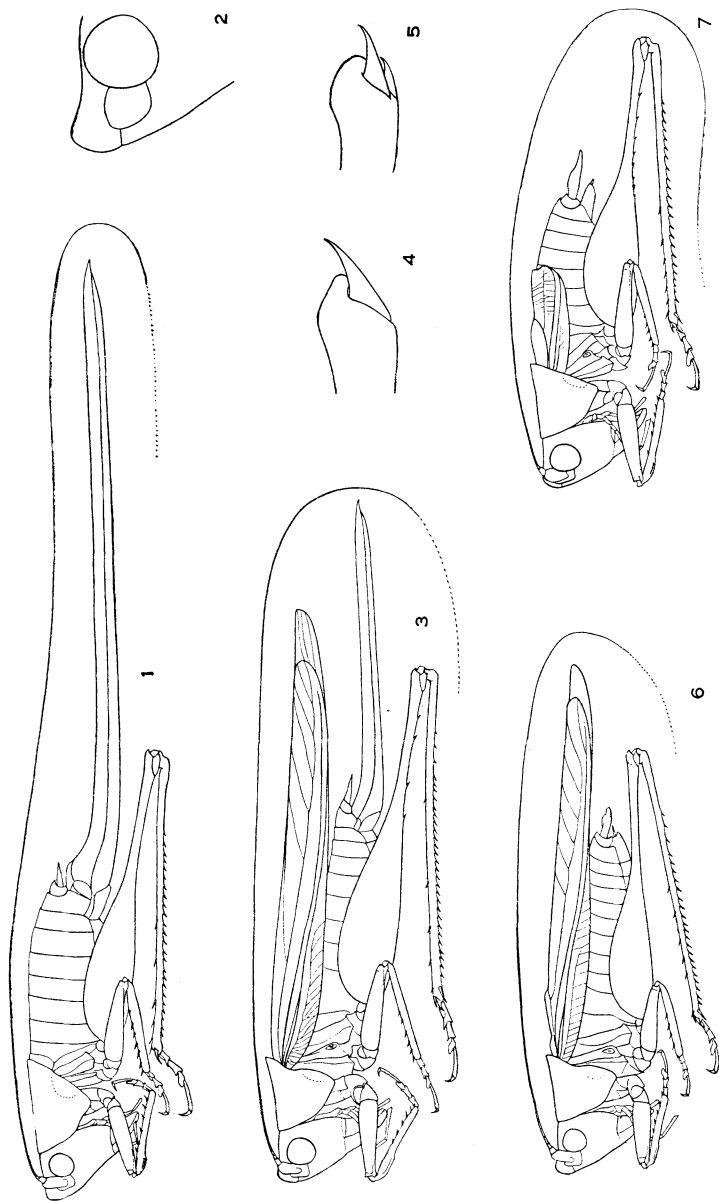
Outline of male subgenital plate. ($\times 5\frac{1}{2}$)

Figs. 32 and 33.—*Conocephalus longipes* (Redtenbacher). Carcaraña, Argentina.

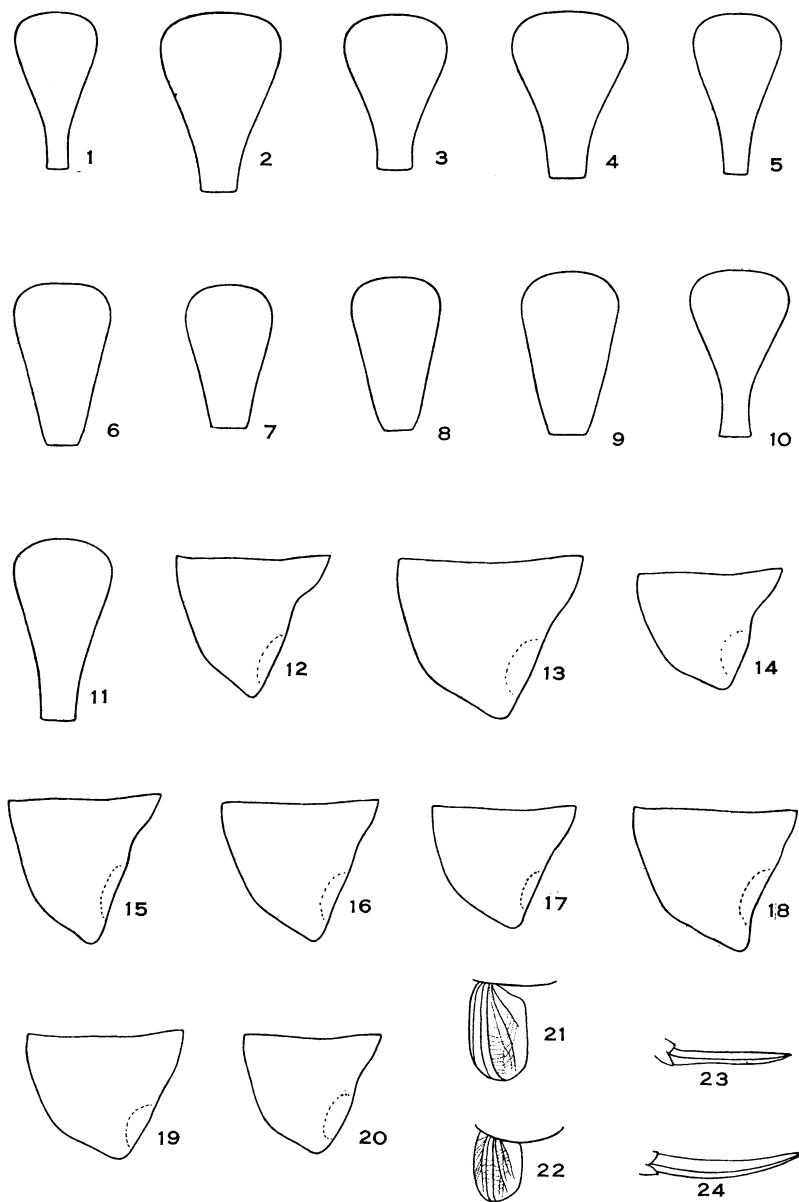
Plate XXIV

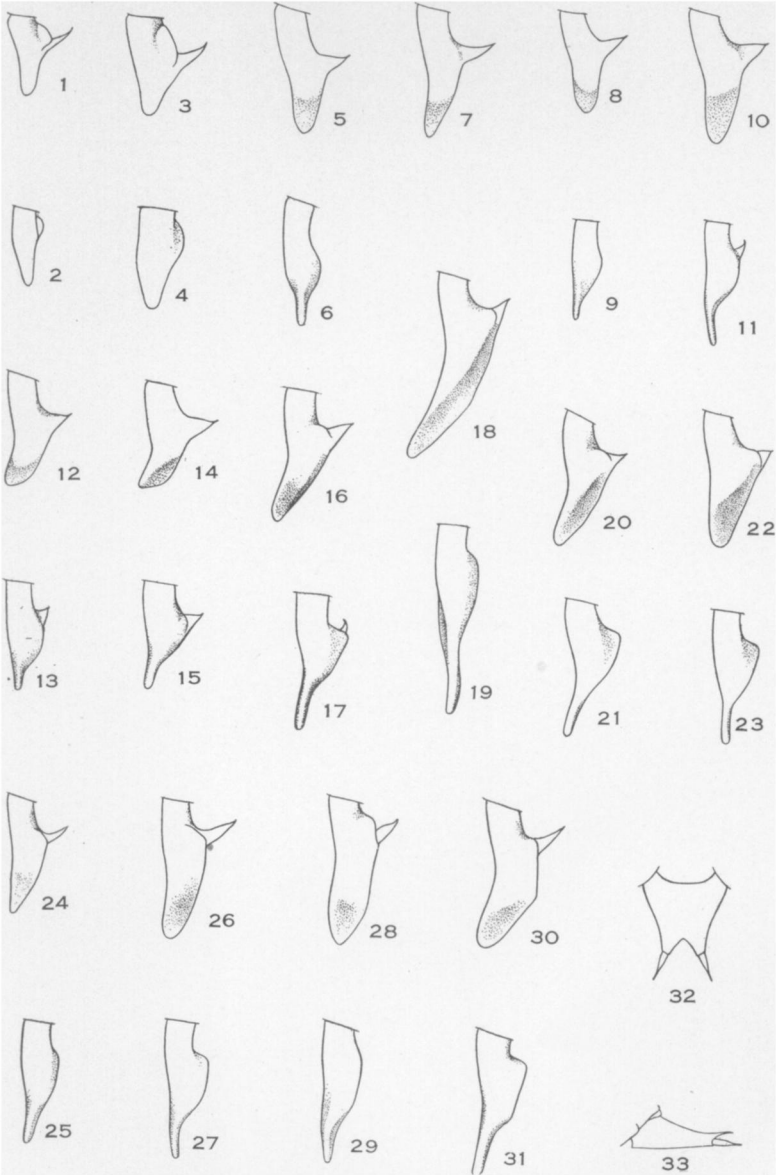
Stridulating field of male tegmen. ($\times 10$)

- Fig. 1.—*Conocephalus longipes* (Redtenbacher). Carcaraña, Argentina.
 Fig. 2.—*Conocephalus vitticollis* (Blanchard). El Olivar, Colchagua, Chile.
 Fig. 3.—*Conocephalus ictus* (Scudder). Otoyac, Mexico.
 Fig. 4.—*Conocephalus insularis* (Morse). Pinar del Rio, Cuba.
 Fig. 5.—*Conocephalus iriodes* new species. Kaiteur, British Guiana. (*Type*)
 Fig. 6.—*Conocephalus angustifrons* (Redtenbacher). Juan Viñas, Costa Rica.
 Fig. 7.—*Conocephalus truncatus* (Redtenbacher). Petropolis, Brazil.
 Fig. 8.—*Conocephalus versicolor* (Redtenbacher). Caparo, Trinidad.
 Fig. 9.—*Conocephalus ochrotelus* new species. Itatiba, Brazil. (*Type*)

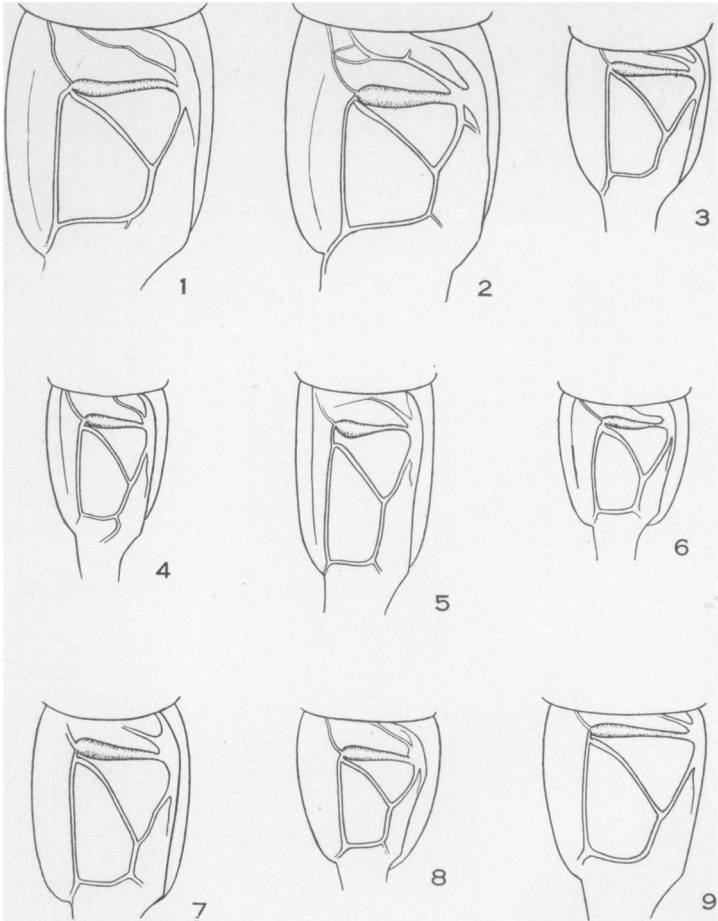


REHN AND HEBARD—AMERICAN TETTIGONIIDAE





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